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THE MARINE REVIEW

VOL. 48 CLEVELAND JANUARY, 1918 NEW YORK No. 1

Lake Fleet as a Big War Machine

Record of Freight Moved During 1917 Shows Importance of Lake Shipping in Advancing Government's War Plans—Prospects for 1918 Are Encouraging

EVEN a pacifist must concede this one small truth in war's favor—it is an intensive post graduate course in geography. The American family clustered around the atlas to see just where Luneville and the American trenches are, can already tell glibly the location of Kiao-chau, Kut-el-Amara, Jaffa, Gorizia, Helgoland and Columbus, N. M. Dozens of towns which were beyond our ken a few years ago are now as familiar as the stations reached by our regular suburban express.

Now with Uncle Sam about down to weight and ready to leave his training camp, we are still confronted by the abyssmal ignorance of many loyal Americans regarding the geography of their native land. While a mutual pardon may be freely granted for being ignorant of the exact site of Red Gulch, the Great Lakes are somewhat too large and too important to be lightly bandied about by the well meaning but monstrously ignorant patriot.

Carrying Ships Over the Mountains

All of which is introductory to a "sure cure" suggestion for one of the country's chief ailments—the transportation problem—advanced a few days ago by a resident of the Atlantic seaboard and given prominence in an eastern paper. The suggestion in brief was that the smaller freight boats, which are now being laid up for the winter, be brought from the Great Lakes to the Atlantic through the Erie canal, while the larger ones were hurried down the St. Lawrence river before their myopic owners had time to give the lake ice an opportunity to bar that passage.

Fortunately the absurdity of this suggestion is clear to practically all Americans. But only a few clearly appreciate the great record of the lake fleet in the season which is just closing.

The total freight carried through the Soo canal, up to Dec. 1, as shown in detail on another page, aggregated 87,253,760 net tons, a drop of 1,872,084 net tons from last year. Iron ore shipments alone, up to the opening of December, totaled 61,587,426 gross tons, a decline of 2,060,872 tons from 1916. When this immense tonnage of iron ore is set up against the steel tonnage involved in our shipbuilding and munitions programs, a keener insight into the importance of lake commerce is gained. Incidentally the conviction grows stronger that no fleet of barges and ships of Erie canal draft and Welland canal length could possibly hang up such a record.

The falling off in 1917 from the freight carrying records set the previous year is in no way due to a decline in the fleet's efficiency. A fuller appreciation of the season's record reveals an increased efficiency—an increase which came just when needed as the country's railroads have been staggering under a load beyond their capacity to carry. The total freight carried on the lakes in 1917 fell off only about 2 per cent, although the length of the navigation season was close to 15 per cent shorter than in the preceding year. Ice blocked the boats until almost June 1, while in 1916 navigation was unrestricted after April 22.

What to Expect in 1918

The prospects for the 1918 season on the Great Lakes are highly encouraging. The demand for iron ore, grain and coal, the three major items of bulk freight handled on these inland waterways, will undoubtedly be as heavy as during 1917. To supply this demand, there will be fewer ships available as a number have been transferred to the Atlantic coast. Against this decrease is the slightly larger number of big ships, some of which are still under construction, while some were in service only for a short time during 1917.

Most students of lake affairs, however, base their confidence in the 1918 situation, upon the plan for handling most of the vessels under a central war board. Centralized control was practiced in a smaller way during 1917 with good results. The plan is now being broadened, so that the fullest efficiency of every unit of the lake fleet is to be obtained at all times.

The 1917 record of the lake fleet is inspiring; the 1918 record promises to be fully as satisfactory.

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Patriotism Stirs New York Meeting

Society of Naval Architects and Marine Engineers Holds Memorable Meeting—Labor Problems and Scientific Management Discussed

THE far-reaching effects of the new era in American shipbuilding brought about by the war were emphasized in the proceedings of the twenty-fifth general meeting of the Society of Naval Architects and Marine Engineers, which was held in the Engineering Societies building, New York, on Thursday and Friday, Nov. 15 and 16. Not only was the meeting the largest in point of attendance in the history of the society, but also one of the most important, in view of the variety and character of the papers and discussions presented at the four half-day sessions. The program was featured by papers dealing with welfare and labor problems in shipyards, together with a special discussion on scientific management as applied to shipbuilding. The discussions on this subject were unusually animated and replete with interesting suggestions, showing that the society is moving in the right direction in broadening the scope of its programs.

Efficiency in Employment

The professional sessions were opened on Thursday morning by the presentation of a paper by Samuel W. Wakeman, general superintendent, Fore River plant, Bethlehem Shipbuilding Corp., Quincy, Mass., entitled "The Service Department of a Shipyard". This paper describes certain methods of handling the labor and employment problems at the Fore River plant, by means of a service department. Its scope is as follows: Employment, hospital, safety work, educational work, apprentices, employes' club, works paper, suggestions committee work, yard restaurants, and shop training. The personnel of the service department includes a superviser, an assistant, clerk, stenographer, superviser of instructors, employment agent, employment clerk, door man, doctors, nurses, messenger boys for conducting applicants to shops, etc. This department handles all problems relating to labor. Before the department was placed in operation in order to maintain a force of about 4000 employes, it was found necessary to hire 8000 men in the course of the year. During the past six months, the force has been increased from 4000 to 8000 and this has been accomplished by hiring 9000 men.

In the discussion of this paper, the work of the industrial service bureau of the shipping board, headed by Meyer Bloomfield, formerly with the Fore River Shipbuilding Co., was commented upon. Mr. Wakeman's paper also was discussed by A. W. Carmichael, assistant naval constructor, U. S. navy yard, New York City. Constructor Carmichael also acted as secretary pro tem during the meeting.

New Officers

Elected at the Annual Meeting Nov. 15, 1917

Vice Presidents

Term Expires Dec. 31, 1920

William F. Durand, professor of mechanical engineering, Stanford University, Cal.; Rear-Admiral W. L. Capps, United States navy; Rear-Admiral David W. Taylor, chief constructor, United States navy; Homer L. Ferguson, president, Newport News Shipbuilding & Dry Dock Co., Newport News, Va.

Vice President

Term Expiring Dec. 31, 1918

Prof. Cecil H. Peabody, Massachusetts Institute of Technology, Boston, vice, G. E. Weed, deceased.

Members of Council

Term Expires Dec. 31, 1920

Daniel H. Cox, naval architect, New York; J. W. Powell, vice president, Bethlehem Shipbuilding Corp., Quincy, Mass.; W. A. Dobson, naval architect, Wm. Cramp & Sons Ship & Engine Building Co., Philadelphia; Prof. H. C. Sadler, University of Michigan, Ann Arbor, Mich.; F. L. Du Bosque, assistant engineer, Pennsylvania railroad, New York; A. C. Pessano, chairman, Great Lakes Engineering Works, New York.

Associate Members of Council

Term Expires Dec. 31, 1920

H. L. Aldrich, publisher, Marine Engineering, New York; H. H. Raymond, steamship manager, Clyde Steamship Co., New York.

Associate Member of Council

Term Expiring December, 1918

E. M. Bull, vice president, A. H. Bull Steamship Co., New York; vice J. S. Hyde, deceased.

Secretary-Treasurer

Term Expires Dec. 31, 1918

Daniel H. Cox, New York.

Executive Committee for 1918

Stevenson Taylor, ex officio; W. L. Capps, Andrew Fletcher, W. M. McFarland, F. L. Du Bosque, J. W. Powell and D. H. Cox.

Committee on Papers for 1918

Wm. M. McFarland, F. L. Du Bosque and H. L. Aldrich.

A Thousand Wooden Ships

In a paper on the shipbuilding resources of the Gulf states by Charles N. Crowell, manager, Galveston Dry Dock & Construction Co., Galveston, Tex., it is stated that the plan of the original shipping board for the construction of 1000 wooden ships in a year is not an impossible proposition. "It depends simply," Mr. Crowell said, "on proper organization and a reasonable period of time." This paper was discussed by Stevenson Taylor, president, American Bureau of Shipping, New York, who pointed out the necessity for careful workmanship in wooden shipbuilding. Timbers, Mr. Taylor said, should be carefully fayed up and their surfaces fitted together accurately. Next in importance are the fastenings. Not only should they be properly designed, but, if the ships are to stand the pounding of the seas, they must be properly driven by expert workmen.

A paper covering the results of tests on the Great Lakes bulk freighter PONTIAC was presented by A. George Matteson and Thomas Durkin. Mr. Matteson is consulting engineer, Great Lakes Engineering Works, Detroit, and Mr. Durkin is associated with him. This paper is published practically in full elsewhere in the present issue.

Questions Efficiency Figures

Mr. Matteson's figures on the boiler economy of the PONTIAC were attacked by Walter M. McFarland, Babcock & Wilcox Co., New York. Mr. McFarland claimed an impossible efficiency was shown. He pointed out that 75 per cent efficiency in the case of coal-fired boilers and 80 per cent when burning fuel oil is extraordinarily good practice. He stated that a 6-hour trial is too short for boiler test purposes. Another speaker pointed out that part of the discrepancy of Mr. Matteson's figures may be due to variations in the length of the stroke of the pump used to measure the boiler feed water. These variations may easily range from 7 to 15 per cent. In rebuttal Mr. Matteson said that the pump stroke was measured carefully and that although the slippage was a doubtful factor, it was checked to 5 per cent. He attributed the results to good firing and generally favorable conditions.

"Cargo Ship Lines of Simple Form" was the title of a paper presented by Naval Constructor William McEntee. In this paper Mr. McEntee stated in part: "The tendency in ship construction for a long period has been in the direction of simplification. In general, the simplification of form requires the use of plane surfaces, wherever possible, instead of curved surfaces. Where curvature is un-

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avoidable, the simplest of curves, the circle, should be used. All curvature should be in one direction only; that is, surfaces of double curvature should be avoided as far as possible. These considerations led, in the forming of a ship to the adoption of a midship section formed by two vertical lines and a horizontal line at the bottom, the corners or bilges being rounded off by circles of suitable radii. In general, it appears to be safe to conclude that cargo vessels can be built of simplified lines which will give practically as good results from the resistance standpoint as those built from the present conventional lines. If propulsive efficiency also is taken into account, it is believed that the simplified form will have at least in certain cases, advantages over the present type."

In discussing this paper, Prof. Herbert C. Sadler, University of Michigan, Ann Arbor, Mich., described a ship with angular bilges, using straight frames. It was stated that some contracts for ships of this type have been let by the Emergency Fleet corporation. This type of construction does away with double curvature at the bilge.

Instead of presenting his paper entitled "Labor and Patriotism", Assistant Naval Constructor A. W. Carmichael made a few informal remarks regarding the labor problem in American shipyards. "A riveter," he said, "who drives only 30 rivets when he could drive 100 is deliberately standing in the way of productivity of a character vitally needed for winning the war. Let the American Federation of Labor tell us," he continued, "how long it is going to take to educate labor in this country to a patriotic point of view." Sevenson Taylor, who occupied the chair, warmly seconded Constructor Carmichael's remarks, pointing out the importance of the labor problem.

Two exceedingly interesting papers on the submarine problem were presented by Naval Constructor E. S. Land and Marley F. Hay of the Denny-Hay Submarine Co., Dumbarton, Scotland, respectively. Constructor Land traced the growth of the submarine and described the various types commenting on the relative advantages of single and double hull construction. Mr. Hay said that Germany's pre-war submarine construction policy shows that she neither anticipated that England would enter the war nor expected to use the submarine as an important weapon. Germany was the last of the great powers to admit the desirability or need for submarines, according to Mr. Hay. Her belief in submarines has developed only since the war and under the pressure of actual war conditions. In 1911 Mr. Hay said he talked personally with Admiral Von Tirpitz, who said then that he considered submarines in the experimental stage, of doubtful utility and that the German government was not at all convinced that they would form an essential or conspicuous part of future naval programs.

A paper on fabricated ships was presented by R. H. M. Robinson, general manager, Lake Torpedo Boat Co., Bridgeport, Conn. "So far as the writer knows," Mr. Robinson stated, "the fabricated ship is a product of American progressiveness. The construction of fabricated ships makes it possible to have the steel work done by those who are specialists in steel fabrication, with all of the special tools and labor-saving devices at their disposal. It relieves the shipyard operator from a multitude of detail that goes with this work, reducing his problems to the operations of engineering, erection, riveting and assembling."

The discussion on this paper was opened by Professor Sadler, who pointed out that although we speed up the fabrication of ships, there still remains the question of assembling. What is wanted at present is a more perfect ship than heretofore and the whole question of reliability hinges on the riveting. Naval Constructor Carmichael pointed out that to speed-up the shipbuilding program to the desired point, many hundreds of gangs of riveters must be trained and pressed into service. Clifton Yeomans, naval architect, Dravo Contracting Co., Coraopolis, Pa., said that "the rivet hole is the cause of more trouble than any other item in steel ship construction." In Mr. Yeoman's judgment, we cannot have a true standardized ship until we devise a new method of fastening plates. He suggested that some form of lock joint similar to that employed in sheet piling might be adopted.

An unusually comprehensive paper on the problem of scientific management as applied to shipbuilding, was presented by Naval Constructor T. G. Roberts, now stationed at the works of the Fore River Shipbuilding Co. Mr. Roberts' paper was followed by a symposium of addresses on scientific management by prominent experts, including L. P. Alford, editor of *Industrial Management;* C. E. Knoeppel, consulting engineer; Frank G. Gilbreth, consulting engineer, and H. L. Gantt, consulting engineer. The keynote of the symposium was struck by Mr. Gantt, who pointed out that the scientific management of the days before the war is now obsolete. The great problem of today, he said, is that of harmonizing industry. In other words, we are rapidly moving into an era of business for service rather than business for profit. The American workman, Mr. Gantt continued, has greater individual efficiency than the German workman, even taking into account the difference in the scale of wages. The German system, however, is enormously efficient because of the effective co-operation se-

(*Continued on page 33*)

Petition to the President of the United States

Whereas, our country is assuming an increasing large proportion of the burden of carrying on the world war against autocracy; and

Whereas, the production of merchant ships to combat the losses sustained from submarine attacks, mines and other perils of the sea has become of paramount importance; and

Whereas, the assistance and co-operation of the most experienced shipbuilding talent in this country are required for the designing, building and equipping of ships, as well as for the direction of our shipyards in order that the necessary ships may be quickly completed to meet the urgent needs of the hour; and

Whereas, at the present time, no experienced builder of merchant ships occupies any position where the counsel of such men is heard in the decision of national policies while other important industries are now represented by recognized experts; be it therefore

Resolved, that the Society of Naval Architects and Marine Engineers at its twenty-fifth assemblage in the city of New York on Nov. 16, 1917, most respectfully and urgently petitions the President of the United States of America to appoint as a member of the Council of National Defense, a representative builder of merchant ships who shall by reason of his experience, ability and business vision be qualified to sit in the high councils of that most important body.

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Calls on Shipbuilders to Win War

President Taylor in Annual Address Urges Fullest Co-operation of Employers and Employes in Carrying Out Shipbuilding Program—Analyzes World's Ship Construction

By Lieut. Commander Stevenson Taylor, U. S. N. R. F.

JUST one year ago, in the president's address were given his summary of the conditions of shipping and shipbuilding throughout the world. The statistics then given were to his satisfaction and apparently were received with satisfaction by all parties interested.

Not only has much water passed under the bridges in that brief year, but great floods have passed and still are passing, throwing all of those calculations into the discard.

At that time, though there were many who thought our own beloved country should have previously entered into the world war, it really appeared as though we were to be free from any active participation. The renewal of ruthless submarine warfare last February made this impossible and whether we should have been in the melee before or not is not a question for discussion before this society.

United States Justified

It is sufficient that the United States of America has for good cause joined the allies who are fighting the central nations of Europe, and one of the means to be used by this country is the building of many new ships in the old and in many new yards as well as the taking over of all ships previously under construction.

Your President, now a naval officer by one of the exigencies of war, is properly forbidden to give any information that may come to him by virtue of his commission. He has, however, no claims to any special information and in this address will use only statements that have been published in the public press presumably by authority.

Taken from last year's address, we find the total capacity per annum prior to 1916, of shipyards for building merchant vessels, to have been as follows:

	Registered tonnage
United Kingdom, Colonies and Canada	1,984,000
United States, including the Great Lakes	540,000
Germany and Austria-Hungary	527,000
All other countries	634,000
Total capacity per annum of the shipyards of the world	3,685,000

Presented by Lieut. Commander Stevenson Taylor, U. S. N. R. F., at the recent New York meeting of the Society of Naval Architects and Marine Engineers, of which he is president.

Notwithstanding the decrease shown in merchant shipbuilding in the United Kingdom and Germany caused by the necessities of war, owing to the increase in capacity of United States yards (about 100,000 tons) and elsewhere in the world (about 76,000 tons) the total production of merchant vessels in the shipyards of the world during 1917 will be approximately 3,250,000 tons—almost as much as during the banner year of 1913, when there were launched about 3,300,000 registered tons.

But there has been in this country a great change during this same year. In November, 1916, there were about 66 shipyards in the United States in 27 of which were built wood ships. At this time, November, 1917, there are about 142 shipyards in the United States, 59 of which are building wood vessels and four of which are building composite vessels. With the tremendous program of the United States shipping board, to which must be added the 787 new ships for our navy at a cost of $1,150,400,000, from dreadnaughts to submarine chasers—"making the navy the most powerful in the world, second to none," and the necessary additions to our shipyards to accomplish these feats, you may be sure there will be no idle days, but many busy days and nights for several years to come.

It is to be noted that the increase in the number of new wood shipyards is great, but their capacity is not nearly so great as the total capacity of the new steel shipyards. Whether after the completion of the many wood vessels now under contract for delivery in the next two years, there will be any demand for wood ships from these new yards is extremely doubtful because in normal times there is no question concerning the superiority of the steel ships.

Loss of Ships

The amount of destruction of vessels by German submarines is uncertain. British authorities give the net loss of British vessels over 1600 tons, from the commencement of the war to Oct. 31, 1917, as 2,500,000 registered tons. Other authorities say that neutral nations, including the United States, have lost about 1,700,000 tons, making a total of 4,200,000 tons, which is probably too low; certainly much lower than claimed by the German government.

It is clear, however, that the special efforts of the naval vessels of the allies have succeeded in keeping within control the destruction by submarines. British authority also states that between 40 and 50 per cent of the German submarines operating since the war commenced have been destroyed.

One of the great difficulties that faces everyone interested in the building of ships is that presented by the

Building and Operating Our Merchant Fleet

"The announced program of the United States shipping board for a merchant marine at the end of the year 1919, shows a grand total of 14,500,000 deadweight tons capacity, approximately 9,600,000 registered tonnage. This includes all new construction for the Emergency Fleet corporation, all alien and United States ships under construction and commandeered, and the enemy ships that have been seized within our ports.

"To bring to a successful conclusion this program and the successful operation of the ships as well, is a prodigious task requiring all of the energy, enterprise, foresight and earnest activity for which American leaders are noted. That the board may be assisted in its desired accomplishment, the wholehearted support of the members of this society, a unit of men upon whom so much depends, must be given without limit of service or reserve of any sort.

"In order that the successful operation of the contemplated enormous fleet may follow after the war, it will be necessary that some existing shipping laws be modified so that the shipping board may be enabled to compete with all of the other nations, for doubtless following this war of force and destruction there will come a commercial war, a war of the flags upon the seas,"—Lieut. Commander Stevenson Taylor.

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body of workers usually termed labor. Now that every other effort than that which comes under this particular class is to all intents and purposes commandeered to do its utmost in behalf of the nation regardless of time and sacrifice, it is certainly reasonable to expect that labor shall at least be as efficient as possible and shall not take any undue advantage of the situation. That labor thus far has complied with this expectation cannot truly be said. The recent careful and eloquent address of President Wilson before the Buffalo labor convention may bring about a change much to be desired, and indeed absolutely necessary.

The enemy must not be underrated for his whole course during the past three years has shown a preparation and an organization hitherto unequaled. The pity of it is that such preparation and organization have been used for such terrible ends. Nor must it be thought that the people of Germany are not supporting their government. Events have shown that their education has been so completely to this end, that the people themselves feel that the desires of their rulers must be accomplished regardless of all other nations. Were this not so, the German people would ere this have risen in revolt.

What then will bring peace? So long as German territory is free from the awful destruction caused by the occupation of an enemy, just so long will the German people fail to realize that they have not won and cannot win. Only the dire experience that will appeal more to them than even the loss of beloved ones will cause a change of heart and make known to them the wrongs that have been committed in their name.

So America with her wealth, her supreme efforts at home and abroad and above all with her precious blood, free from taint of wishing for more territory, free from desire for indemnities, free from the grosser aspects of war, must with one heart, one mind, and one soul support the President of the United States in this crisis of the world.

First Analysis of Shipping Program

IN a recent announcement the Emergency Fleet corporation makes public for the first time complete details of its shipbuilding program. It was stated that since the corporation was organized contracts have been let for 884 new vessels, aggregating 4,724,300 deadweight tons; that 426 vessels of 3,029,508 tons building on the ways were requisitioned to hasten construction, and that contracts for 99 other vessels of 610,000 tons are pending.

Vessels Contracted, Pending Contract and Requisitioned

This program presents a grand total of 1409 vessels of all types, aggregating 8,363,808 deadweight tons. Of the requisitioned vessels included in this schedule 33 of 257,575 tons have been completed and released. The total deadweight tonnage given represents approximately 6,000,000 gross tons.

The following table shows the number of vessels under contract, pending contract, and requistioned by the Emergency Fleet corporation:

Type of vessel.	Number of vessels	Total deadweight capacity
Wood	375	1,330,900
Composite	58	207,000
Steel	451	3,186,400
Total contracted for	884	4,724,300
Contracts pending	99	610,000
Total	983	5,334,300
Total requisitioned, (all types)	*426	3,029,508
Grand total	1,409	8,363,808

*This total includes requisitioned vessels completed and released—33 vessels; 257,575 tons.

The showing for the 884 vessels contracted for, exclusive of contracts pending for 99 vessels, and also exclusive of requisitioned vessels, follows:

Type of vessel	Number of vessels	Deadweight tonnage
Cargo		
3,500 tons	411	1,438,500
4,000 tons	16	64,000
4,700 tons	12	56,400
5,000 tons	160	800,000
6,000 tons	7	42,000
7,500 tons and under	76	569,200
8,800 tons	54	475,200
9,000 tons	44	396,000
10,000 tons and under	34	323,000
Total	814	4,164,300
Cargo and transport:		
8,000 tons	70	560,000
Grand total	884	4,724,300

Of the 884 vessels under contract, 451 are of steel construction, as follows:

Cargo	Number of vessels	Deadweight tonnage
3,500 tons	6	21,000
4,000 tons	..	.....
4,700 tons	..	.....
5,000 tons	160	800,000
6,000 tons	7	42,000
7,500 tons	76	569,200
8,800 tons	54	475,200
9,000 tons	44	396,000
10,000 tons	34	323,000
Total	381	2,626,400
Cargo and transport:		
8,000 tons	70	560,000
Grand total	451	3,186,400

Of the 884 new vessels under contract 375 are of wood construction, as follows:

Cargo	Number of vessels	Deadweight tonnage
3,500 tons	355	1,242,500
4,000 tons	8	32,000
4,700 tons	12	56,400
Total	375	1,330,900

Of the 884 new vessels under contract 58 are of composite construction, as follows:

Cargo	Number of vessels	Deadweight tonnage
3,500 tons	50	175,000
4,000 tons	8	32,000
Total	58	207,000

The vessels under requisition, all of which are of steel construction and which are exclusive of those delivered and released, are as follows:

	Number of vessels	Deadweight tonnage
Colliers:		
5,000 tons and under	3	14,700
7,500 tons and under	1	6,800
8,800 tons and under	5	43,000
Total	9	64,500
Passenger and cargo:		
5,000 tons and under	7	32,958
6,000 tons and under	2	10,600
Total	9	43,558
Tankers:		
5,000 tons and under	2	9,100
7,500 tons and under	7	49,300
8,800 tons and under	4	33,010
9,000 tons and under	9	81,000
10,000 tons and under	12	115,400
12,500 tons and under	18	192,545
15,000 tons and under	6	84,000
Total	58	565,155
Cargo:		
3,500 tons and under	99	321,240
5,000 tons and under	37	160,200
6,000 tons and under	5	28,000
7,500 tons and under	47	335,460
8,000 tons and under	2	16,000
8,800 tons and under	58	508,200
9,000 tons and under	14	126,000
10,000 tons and under	25	243,170
12,500 tons and under	28	332,450
15,000 tons and under	2	28,000
Total	317	2,098,720
Grand total	393	2,771,933
Grand total requisitioned and under contract	1,277	7,496,233

The requisitioned vessels completed and released are as follows:

	Number of vessels	Deadweight tonnage
Colliers:		
12,650 tons and under	1	12,650
Tankers:		
10,475 tons	1	10,475
Ore carriers:		
6,000 tons and under	2	11,500
11,300 tons and under	4	45,200
17,060 tons and under	1	17,060
Total	7	73,760
Cargo:		
3,500 tons and under	9	28,560
5,000 tons and under	3	12,200
7,500 tons and under	1	6,200
8,800 tons and under	5	43,700
10,000 tons and under	2	19,530
12,500 tons and under	3	37,500
15,000 tons and under	1	13,000
Total	24	160,690
Grand total	33	257,575

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Results of Test on Bulk Freighter

Data Obtained in Comprehensive Power and Economy Tests on Steamer Pontiac—This Steamer is Typical of Standard Bulk Freighters Now Favored for Lake Service

By A. George Matteson and Thomas Durkin

IN VIEW of the fact that a dozen or more ships, duplicates of the PONTIAC, have been completed this season and last, both the builder and owner of the steamer, deemed it advisable to have the PONTIAC thoroughly tested as to speed and economy; all the more so as this class of freighter is being adopted as a standard with the present depth of channels and height of ore-loading docks. It is considered the most practical as well as profitable carrier in the iron ore trade now on the Great Lakes.

The PONTIAC is a bulk freighter of the following principal dimensions: 600 feet over all, 580 feet keel, 60 feet beam and 32 feet deep, and is constructed on the arch girder and transverse frame system with straight hopper sides 6 feet deep from the skin of the ship, extending up to the main deck stringer. This space is used for ballast in addition to the ordinary water bottom, which is 5 feet 6 inches deep, giving a total water ballast capacity of 7300 net tons. This ship is of the single-deck type, having a main deck at the ends only, and her cargo space is free from any obstruction whatsoever. The spar deck has 18 hatches, 12 feet fore and aft, 38 feet wide and 24 feet centers.

The engine, placed aft, has cylinders 24½ x 40 x 65 inches diameter and 42-inch stroke. The low pressure cylinder is placed forward, the high pressure cylinder in the middle and the intermediate aft; sequence of cranks, high pressure, low pressure and intermediate. The high pressure and intermediate cylinders are fitted with piston valves and the low pressure with triple-ported slide valve. All ports and passages are proportioned for a piston speed of 600 feet per minute.

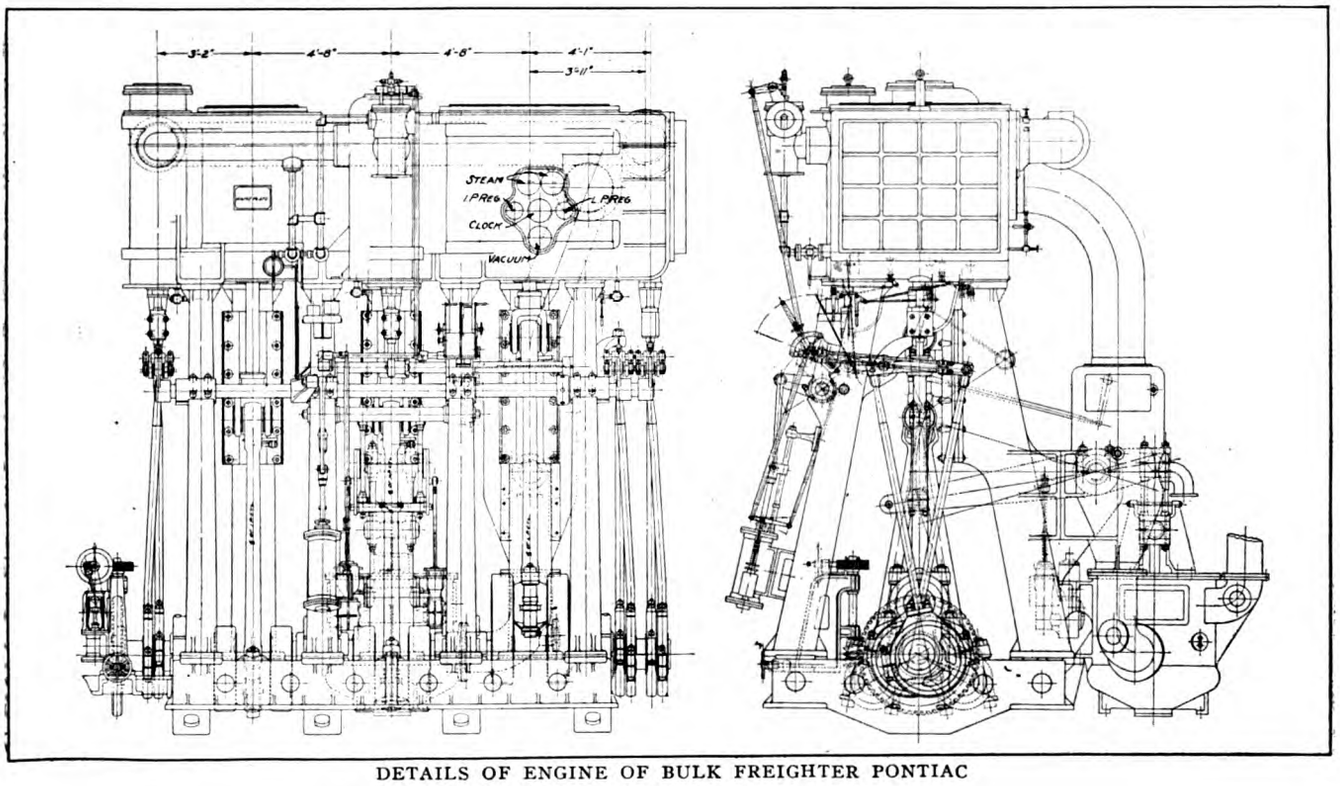
Condenser Equipment

The air pump is 39 inches in diameter by 14-inch stroke, driven from the high pressure cylinder crosshead; one bilge pump 5 inches diameter by 12-inch stroke and one cold water pump 3½ x 12 inches are worked from the air pump beam.

The condenser is of the injection type as is customary on the Great Lakes. The main shaft is 12¾ inches in diameter, thrust shaft 12¾ inches and the outboard shaft 14 inches in bearing. The propeller, of the sectional type, is 15 feet in diameter by 13 feet 9 inches pitch at the tip, the four blades having a developed area of 83 square feet. The auxiliary machinery includes one feed pump of the simplex, double acting, pot-valve type, 12 inches and 7½ x 16 inches; one fire pump of the duplex, double acting, pot-valve type, 12 x 6 x 12 inches; one sanitary, one fresh water and one mate's pump of the duplex, double acting, pot-valve type, 6 inches and 4 x 6 inches. All the above pumps are horizontal and outside packed.

To handle the great amount of water previously mentioned in six hours, four pumps are installed: Two 15-inch centrifugals direct-driven by double, vertical engines, and two horizontal reciprocating pumps, 8 x 12 x 14 inches, all working in unison by means of one double manifold connected to all compartments. The electrical generators include two of 15 kilowatts each, driven by a 7 x 7-inch vertical engine, and one of 5 kilowatts driven by a 5 x 5-inch vertical engine wired to all living quarters, machinery space and also to all parts of the cargo hold. One all-

Presented at the recent New York meeting of the Society of Naval Architects and Marine Engineers by the authors, Thomas Durkin and A. George Matteson, the latter being a member of the society.



DETAILS OF ENGINE OF BULK FREIGHTER PONTIAC

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around steam steering engine is geared direct to the quadrant.

The deck auxiliaries include six mooring engines of regular size; two smaller ones for handling the hatch covers and one windlass.

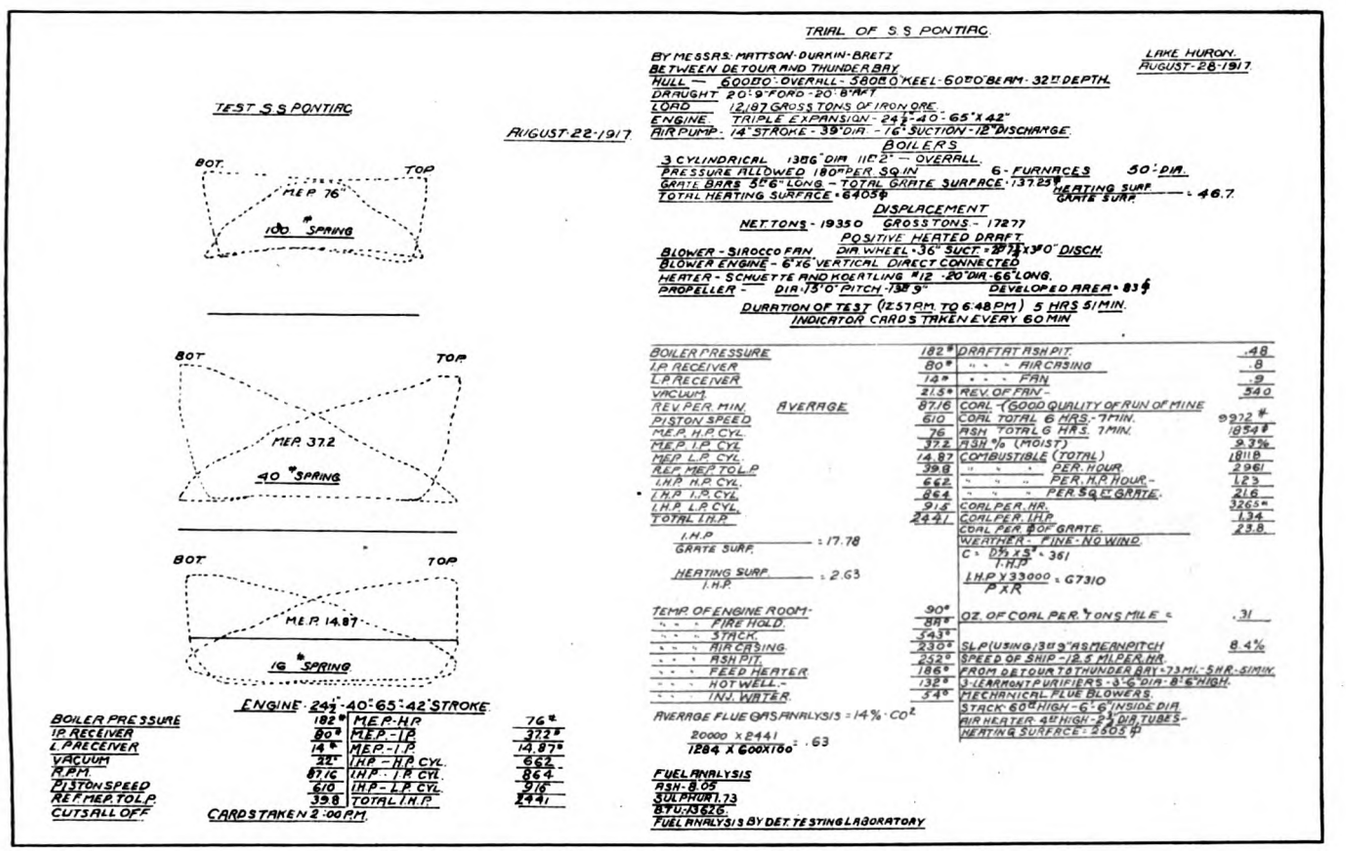
Boilers

The three boilers are of the cylindrical type, 13 feet 6 inches inside diameter x 11 feet 2 inches long overheads; each fitted with two corrugated, Morrison furnaces 50 inches inside diameter; 294 tubes, 3 inches external diameter and 7 feet 8 inches long between tube plates, built according to boiler room installation are: The closed feed water heater, through which the exhaust from all the auxiliaries passes, the feed water, after being forced through the heater tubes, being discharged into vertical purifiers, one for each boiler, with the result that the boilers are thoroughly clean; two 6-inch compound hydraulically operated ash guns are located on the forward bulkhead of the fireroom, as a speedy and convenient method for discharging the ashes.

It is worthy of note that the crew, privileged to work in the fireroom, do so in ample and cool quarters, conapparatus of the Ossat type was used freely, showing an average reading of 14 per cent carbon dioxide (CO_2) proving not only that the fires were kept in good condition but also that a small additional amount of air, introduced above the grate, would have been beneficial.

Indicator cards and temperature of feed water, air heaters, ash pits, etc., as well as air pressure, were taken hourly.

The 6-hour economy test was accomplished mostly during daylight, and the only auxiliaries in use were the fan engine, feed pump, the 5-kilowatt generator and the fire pump, only when


TRIAL OF S.S PONTIAC
BY MESSRS. MATTSON-DURKIN-BRETZ
BETWEEN DETOUR AND THUNDER BAY
LAKE HURON.
AUGUST-28-1917
HULL — 600'0" OVERALL - 580'0" KEEL - 60'0" BEAM - 32'1" DEPTH.
DRAUGHT 20'9" FORD - 20'8" AFT
LOAD 12,187 GROSS TONS OF IRON ORE.
ENGINE TRIPLE EXPANSION - 24½" - 40" - 65" X 42"
AIR PUMP - 14" STROKE - 39" DIA. - 16" SUCTION - 12" DISCHARGE.
BOILERS
3 CYLINDRICAL 13'6" DIA 11'2" — OVERALL.
PRESSURE ALLOWED 180 PER SQ IN 6 - FURNACES 50" DIA.
GRATE BARS 5'6" LONG - TOTAL GRATE SURFACE - 137.25 HEATING SURF. / GRATE SURF. = 46.7
TOTAL HEATING SURFACE - 6405 ft
DISPLACEMENT
NET TONS - 19350 GROSS TONS - 17277
POSITIVE HEATED DRAFT.
BLOWER - SIROCCO FAN DIA WHEEL - 36" SUCT - 27½" x 30" DISCH.
BLOWER ENGINE - 6"x6" VERTICAL DIRECT CONNECTED
HEATER - SCHUETTE AND KOERTLING #12 - 20" DIA - 66" LONG.
PROPELLER - DIA 13'0" PITCH - 13'9" DEVELOPED AREA - 83 ft
DURATION OF TEST (12.57 PM TO 6.48 PM) 5 HRS 51 MIN.
INDICATOR CARDS TAKEN EVERY 60 MIN
TEST S.S PONTIAC
AUGUST 22-1917
BOT. TOP
M.E.P. 76
100 # SPRING
BOT TOP
M.E.P. 37.2
40 # SPRING
BOT TOP
M.E.P. 14.87
16 # SPRING
ENGINE 24½" - 40" - 65" - 42" STROKE
BOILER PRESSURE 182 # M.E.P.-H.P. 76 #
I.P. RECEIVER 80 # M.E.P.-I.P. 37.2 #
L.P. RECEIVER 14 # M.E.P.-L.P. 14.87 #
VACUUM 22" I.H.P. - H.P. CYL. 662
R.P.M. 87.6 I.H.P. - I.P. CYL. 864
PISTON SPEED 610 I.H.P. - L.P. CYL. 916
REF. M.E.P. TO L.P. 39.8 TOTAL I.H.P. 2441
CUTS ALL OFF
CARDS TAKEN 2:00 P.M.
BOILER PRESSURE 182 # DRAFT AT ASH PIT .48
I.P. RECEIVER 80 # " " AIR CASING .8
L.P. RECEIVER 14 # " " FAN .9
VACUUM 21.5" REV. OF FAN - 540
REV. PER MIN. 87.16 COAL - (GOOD QUALITY OF RUN OF MINE
PISTON SPEED 610 COAL TOTAL 6 HRS. - 7 MIN. 9272 #
M.E.P. H.P. CYL. 76 ASH TOTAL 6 HRS. 7 MIN. 1854 #
M.E.P. I.P. CYL. 37.2 ASH % (MOIST) 9.3%
M.E.P. L.P. CYL. 14.87 COMBUSTIBLE (TOTAL) 18118
REF. M.E.P. TO L.P. 39.8 " " PER HOUR 2961
I.H.P. H.P. CYL. 662 " " PER H.P. HOUR - 1.23
I.H.P. I.P. CYL. 864 " " PER SQ. FT. GRATE. 21.6
I.H.P. L.P. CYL. 916 COAL PER HR. 3265 #
TOTAL I.H.P. 2441 COAL PER I.H.P. 1.34
I.H.P. / GRATE SURF. = 17.78 COAL PER # OF GRATE. 23.8
HEATING SURF. / I.H.P. = 2.63 WEATHER - FINE - NO WIND.
C = D²N x S / 33000 = I.H.P.
I.H.P x 33000 / P x R = 67310
TEMP. OF ENGINE ROOM - 90°
" " FIRE HOLD 84°
" " STACK 343°
" " AIR CASING 230°
" " ASH PIT 252°
" " FEED HEATER 186°
" " HOT WELL - 132°
" " INJ. WATER 54°
OZ. OF COAL PER ¶ ONE MILE = .31
SLIPUSING 3.8 % AS MEAN PITCH 8.4%
SPEED OF SHIP - 12.5 MILES PER HR.
FROM DETOUR TO THUNDER BAY - 73 MI. - 5 HR. - 51 MIN.
3 - LEARMONT PURIFIERS - 3'-6" DIA - 8'-6" HIGH.
MECHANICAL FLUE BLOWERS.
STACK: 60" HIGH - 6'-6" INSIDE DIA
AIR HEATER: 4" HIGH - 2½ DIA. TUBES -
HEATING SURFACE - 2805 ft
AVERAGE FLUE GAS ANALYSIS = 14% CO²
20000 x 2441 / 1284 x 600 x 180 = .63
FUEL ANALYSIS
ASH - 8.08
MOISTURE 1.73
B.T.U. 13626
FUEL ANALYSIS BY DET. TESTING LABORATORY

RESULTS OF POWER AND ECONOMY TESTS ON S. S. PONTIAC

U. S. government rules for 180 pounds working pressure. The grate bars are 5 feet 6 inches long with Sturrock patent bridge walls, 12 inches high from the grate.

The total heating surface of the three boilers is 6402 square feet and total grate surface 137¼ square feet. The boilers are worked under a system of heated positive draft. The fan supplying the necessary air for combustion has a fan wheel 36 inches in diameter by 18-inch face, driven direct by a 6 x 6-inch vertical engine. The suction air duct is extended into the fireroom to give improved ventilation there. The boilers are also equipped with mechanical flue blowers, arranged so that the tubes in the boilers as well as air heater can be thoroughly cleaned at any time.

Other important features of the boiler room installation are: The closed feed water heater, through which the exhaust from all the auxiliaries passes, the feed water, after being forced through the heater tubes, being discharged into vertical purifiers, one for each boiler, with the result that the boilers are thoroughly clean; two 6-inch compound hydraulically operated ash guns are located on the forward bulkhead of the fireroom, as a speedy and convenient method for discharging the ashes.

It is worthy of note that the crew, privileged to work in the fireroom, do so in ample and cool quarters, contributing considerably to the good results obtained.

The object of this test was to ascertain the speed, with full cargo, on Lake Huron from Detour light to Fort Gratiot, a distance of 225 miles. The fuel being of a good quality, it was decided to run with maximum power and to collect all data regarding the economy of the propelling machinery under these conditions. To that effect the valve motion was thrown in full gear and steam kept steadily at allowed pressure. Coal and ashes were carefully weighed for six hours, which coincides with the watches in the fireroom. The water level in the boiler, 4 inches in the glass, remained constant during the entire test. Six fires were cleaned and the flue blowers operated once as customary, during the six hours. An accumulated ashes were sent overboard.

The weather was ideal, very little wind and sea, and the 12½-mile speed down Lake Huron was maintained. The steam pressure never varied and due credit is given the intelligent work of the firemen.

General Results

The compiled data are given in an accompanying illustration and the general result only is repeated:—

Speed 12½ miles per hour (10.875 knots).

Coal per hour as fired, 3265 pounds.

Coal per indicated horsepower per hour, 1.34 pounds, which proved that with ample heating and grate surfaces, together with a good quality of fuel, the economy, as expressed in coal per indicated horsepower, is as high with full power, being employed, as with lesser.

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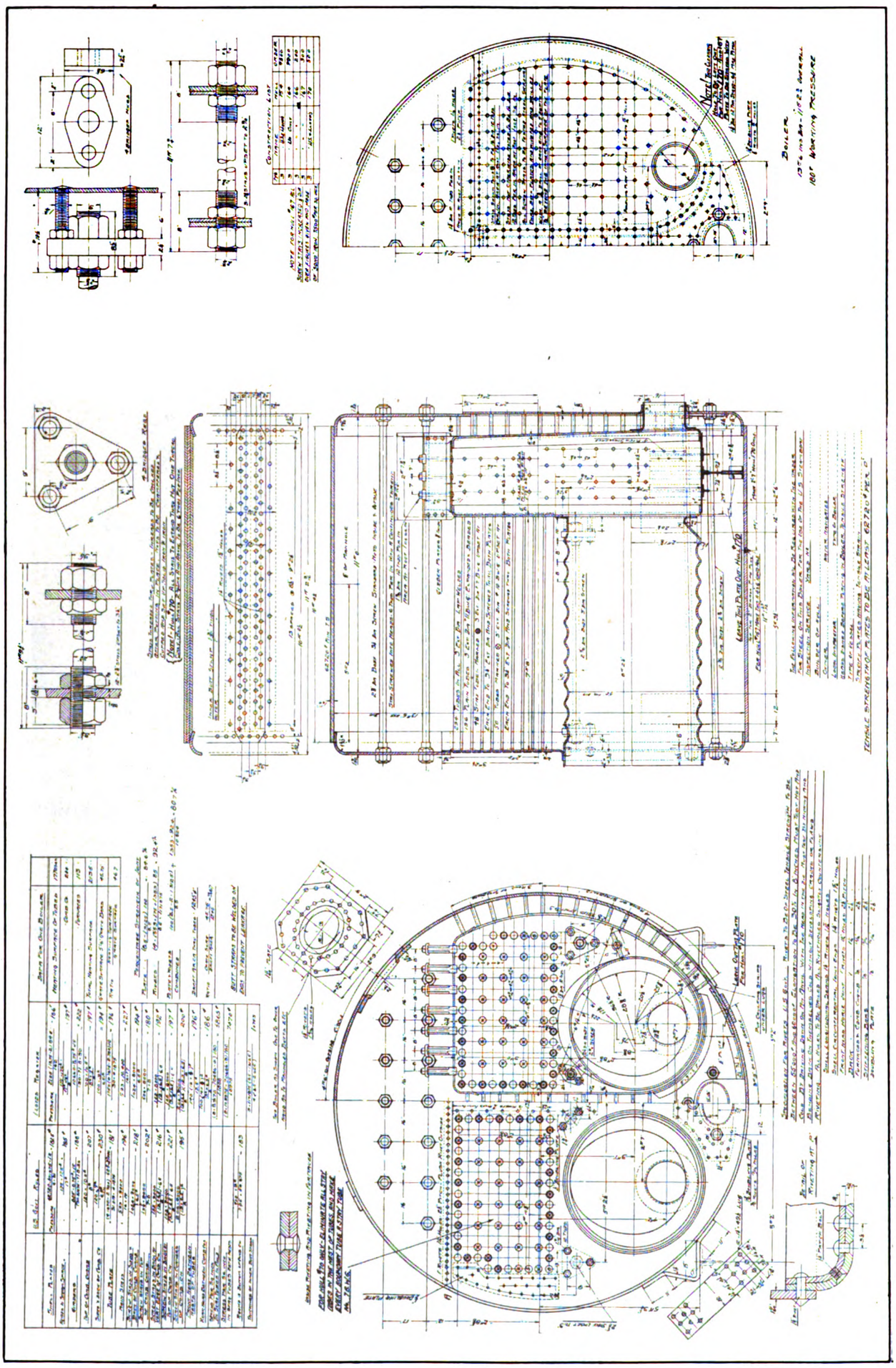

DETAILS OF BOILER CONSTRUCTION OF LAKE STEAMER PONTIAC

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Indicated horsepower, 2441; 17.78 indicated horsepower per square foot of grate; 23.8 pounds of coal per square foot of grate.

This result was accomplished with slightly less than 1-inch air pressure at the fan and an average of 0.48-inch in the ash pit.

Admiralty coefficient, 351.

The machinery worked splendidly, boilers and all piping perfectly tight throughout the ship, and the performance on the whole was to the entire satisfaction of the owners.

In connection with the power and fuel test it was desired also to have data on the efficiency of the boilers and no apparatus being available to weigh the feed water, the displacement of the feed pump was used to measure this; to that effect the valves were carefully ground and made tight previous to the test, feed pump plunger and stroke were carefully calibrated, number of strokes measured by revolution counter, and the following result was obtained:

Feedwater per hour (assuming 6 per cent slip), pounds	37,758
Water evaporated from 186 degrees per pounds of coal, pounds	11.56
Equivalent water evaporated from air at 212 degrees, pounds	12.48
Water evaporated from 186 degrees per pounds of combustible, pounds	12.66
Equivalent water evaporated from air at 212 degrees, pounds	13.68
Efficiency of boiler, per cent	81
Efficiency of boiler and grate, per cent	88
Feedwater per indicated horsepower per hour, main and auxiliary engines, pounds	15.47
Feedwater per indicated horsepower per hour, main engine only, pounds	15.22

Soo Canal Report

EAST BOUND

	To Dec, 1916	To Dec, 1, 1917
Flour, barrels	8,202,139	7,569,259
Wheat, bushels	203,701,009	167,475,263
Grain, bushels	83,420,259	60,406,719
Copper, net tons	122,796	116,227
Iron ore, net tons	62,183,593	60,121,674
Pig iron, net tons	12,050	10,624
Lumber, M. ft. B. M.	339,563	348,338
Gen. merch., net tons	319,691	251,050
Passengers, number	28,009	18,858

WEST BOUND

Flour, barrels	13,381	90
Grain, bushels	9,245	8,185
Coal, hard, net tons	2,076,901	2,510,458
Coal, soft, net tons	13,508,955	15,240,969
Iron ore, net tons	28,927	65,429
Mfctd. iron, net tons	160,278	91,058
Salt, barrels	704,227	569,956
Gen. merch., net tons	1,181,673	1,206,946
Passengers, number	24,345	18,760

SUMMARY

Vessel passages, No.	24,645	22,305
Regis. tonnage, net	68,022,114	63,724,473
Freight:		
Eastbound, net tons	71,962,372	68,054,103
Westbound, net tons	17,163,472	19,199,657
Total frght., net tons	89,125,844	87,253,760

Vessels Cleared

Clearance has been given five Porto Rican schooners,, a Spanish bark, a Russian bark and a Russian ship, which have been held in New Orleans because of a ruling that such ships could not ply into the submarine danger zone. A recent amendment to this ruling to the effect that it applied only to American-owned ships, allowed this small fleet to put to sea, everyone heavily laden with general cargo for transatlantic ports.

Will Build Ships for Government

By H. B. Bliss

The Saginaw Shipbuilding Co., recently organized at Saginaw, Mich., has closed contracts for the construction of six steel ships at a cost of between $3,000,000 and $4,000,000. The contracts were signed at Washington by C. W. Stiver, secretary, and Walter C. Hill, treasurer of the new company, and Julius B. Kirby, secretary of the Saginaw board of trade.

The ships are to be of the Emergency Fleet Corporation's standard type modified to Welland canal size, 260 feet long and 43½ feet beam, with a molded depth of 24 feet, 4½ inches. The six boats have been promised before November, 1918. The first keel will be laid in December, this year. The contracts for the steel have been executed. With the operations fully under way it is expected a boat can be turned out in about 20 days.

The Saginaw Shipbuilding Co. was organized in July with a capitalization of $350,000. The company is incorporated to carry on the general manufacture and repair of all kinds of water craft. The plant will be located on the Saginaw river, and the company contemplates building complete ships there.

The president, F. W. Wheeler, is a well known shipbuilder, and in addition to other skilled men the company will have the services of C. W. Stiver, who was associated with Mr. Wheeler in business in Bay City for 15 years.

The contract for constructing the plant was awarded to Frank D. Chase, Chicago. It is expected that the installation of machinery can be started by the middle of November. The plant will have two main buildings, each 60 x 160 feet, and one story high. In addition, there will be a number of small structures, such as blacksmith shop, warehouse, power house, machine shop, paint shop, etc. The structures will be largely of frame construction. Launching ways will have to be constructed.

The Saginaw Shipbuilding Co.'s plant will be located on 20 acres of land with a 2000-foot water frontage immediately north of the Sixth street bridge on the west side of the Saginaw river on the site of the old interurban power house. There is plenty of depth of water for the 24 feet 4 inches which the ships contracted for will draw.

Losses Sustained by British Shipping

Week ending:	Ships over 1600 tons	Under 1600 tons	Total
Mar. 4	14	9	23
Mar. 11	13	4	17
Mar. 18	16	8	24
Mar. 25	18	7	25
Apr. 1	18	13	31
Apr. 8	17	2	19
Apr. 15	19	9	28
Apr. 22	40	15	55
Apr. 29	38	13	51
May 6	24	22	46
May 13	18	5	23
May 20	18	9	27
May 27	18	1	19
June 3	15	3	18
June 10	22	10	32
June 17	27	5	32
June 24	21	7	28
July 1	15	5	20
July 8	14	3	17
July 15	14	4	18
July 22	21	3	24
July 29	18	3	21
Aug. 5	21	2	23
Aug. 12	14	2	16
Aug. 19	15	3	18
Aug. 26	18	5	28
Sep. 2	20	3	23
Sep. 9	12	6	18
Sep. 16	8	20	28
Sep. 23	13	2	15
Sep. 30	11	2	13
Oct. 7	14	2	16
Oct. 14	12	6	18
Oct. 21	17	8	25
Oct. 28	14	4	18
Nov. 4	8	4	12
Nov. 11	1	5	6
Nov. 18	10	7	17
Nov. 25	14	7	21
	660	248	908

Ore Receipts and Shipments

The largest November ore shipments on record were sent down from upper lake ports during the past month. These amounted to 7.333.828 tons, an increase of 1,618,376 tons over the shipment of November, 1916.

The November shipments by ports were as follows:

Port	Nov., 1917	To Dec. 1, 1917
Escanaba	838.096	7,000,870
Marquette	327,113	3,197,213
Ashland	900,241	7,503,479
Superior	1,516,162	13,769,433
Duluth	2,583,620	20,270,617
Two Harbors	1,168,596	9,845,814
Totals	7,333,828	61,587,426
1917 increase	1,618,376	.....
1917 decrease	.....	2,060,872

Ore receipts at Lake Erie ports during November amounted to 5,775,181 tons, as compared to 5,055,239 tons in November, 1916. Ore on docks on Dec. 1 was 10,023,743 tons, against 9,958,306 tons on Dec. 1, 1916. The receipts by ports follow:

Port	Gross tons
Buffalo and Port Colborne	1,004,591
Erie	376,504
Conneaut	917,830
Ashtabula	1,241,743
Fairport	210,193
Cleveland	997,523
Lorain	417,861
Huron	219,441
Toledo	326.914
Detroit	62,581
Total	5,775,181

The M. M. Flechas Shipbuilding Co., Biloxi, Miss., launched the three-masted schooner MARIE, built for a Pascagoula stock company, on Oct. 17. MARIE will be used in gulf trade.

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Photographs From Far and Near

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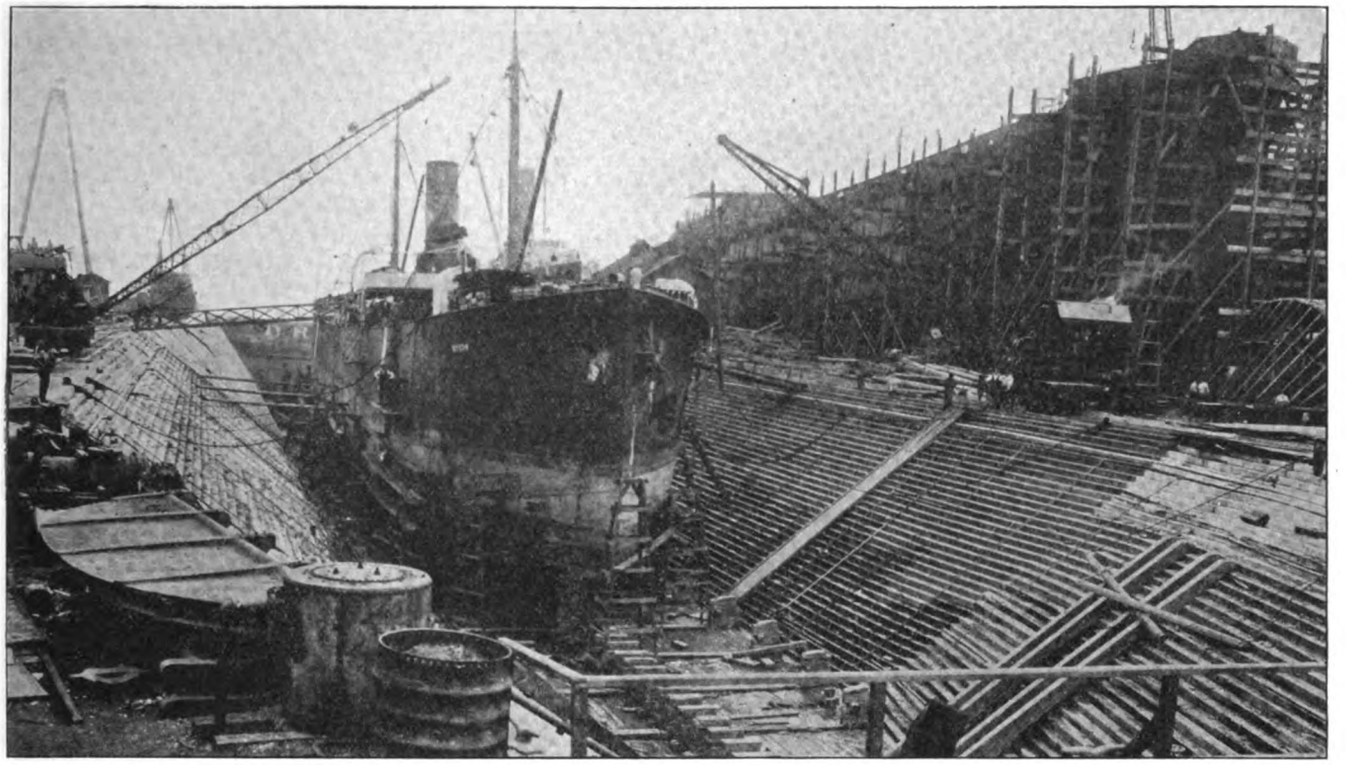
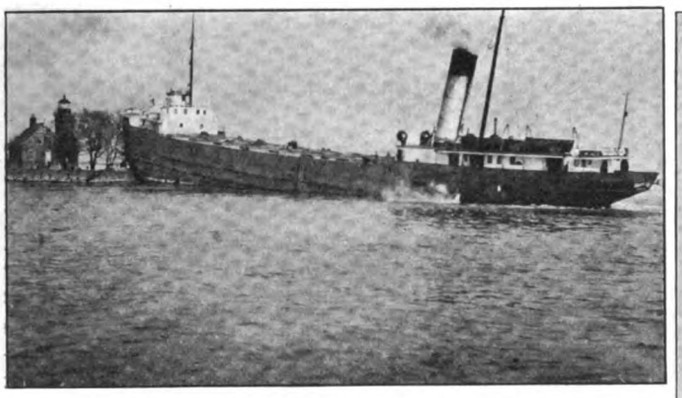
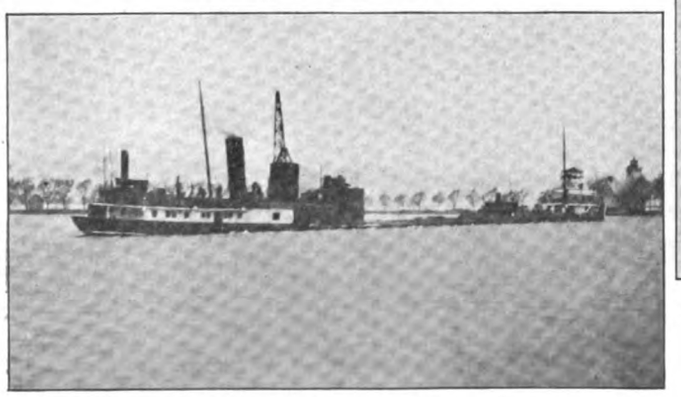
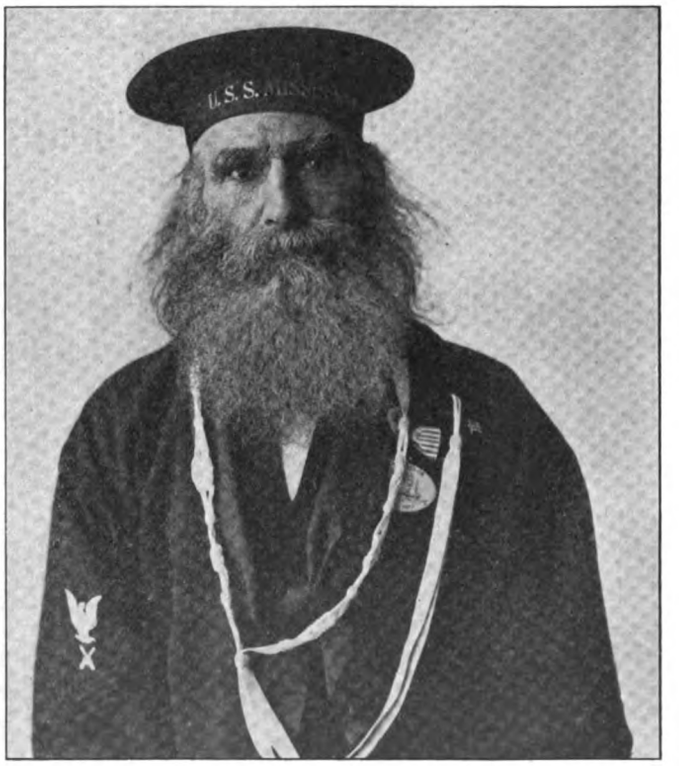


S. S. BYGDO IN LOWER DOCK OF THE BALTIMORE DRY DOCK & SHIPBUILDING CO. THE BYGDO WAS SUNK BY A GERMAN SUBMARINE



TWO ACCIDENTS OF PAST MONTH IN VICINITY OF DETROIT. ABOVE—S. S. MARITANA. BELOW—S. S. JAMES S. DUNHAM





W. H. HARDY, SAID TO BE THE ONLY SURVIVOR OF PERRY'S FIRST LANDING PARTY IN JAPAN, IS NOW TOURING THAT COUNTRY, 60 YEARS LATER

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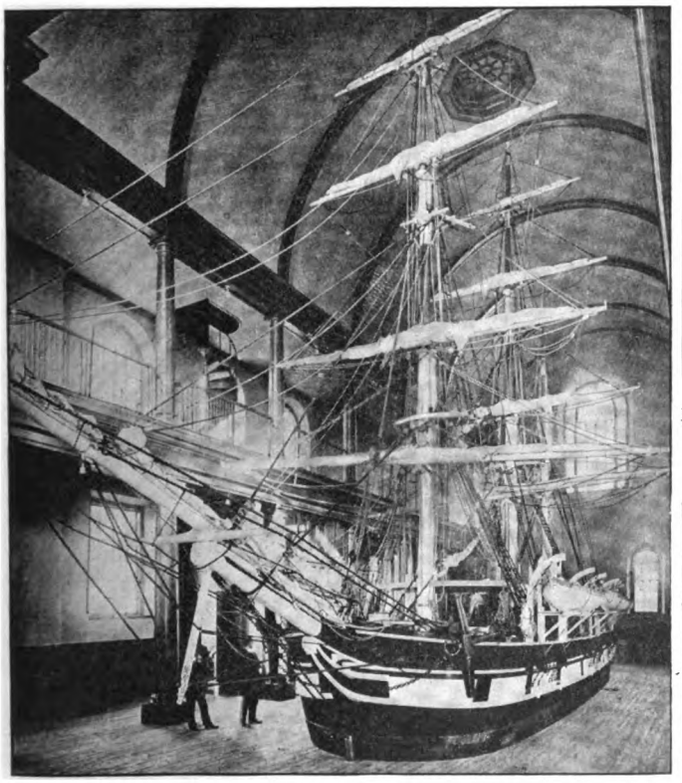
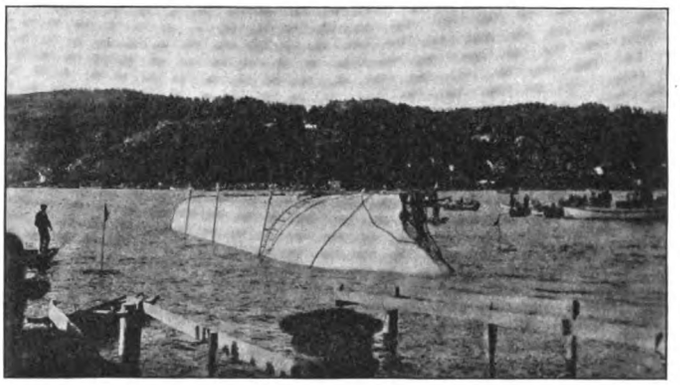
Latest Marine News in Pictures

Payment Will Be Made For Acceptable Photographs

TEACHING SAILORS THE GENTLE ART OF COOKERY AT HOTEL VANDERBILT, NEW YORK CITY—
THE JACKIES ARE APPARENTLY APT PUPILS



HALF-SIZE MODEL OF WHALING SHIP, WHERE IT
REPOSES IN THE MUSEUM OF THE DART-
MOUTH HISTORICAL SOCIETY AT
NEW BEDFORD, MASS.



INNOVATION IN LAUNCHING METHODS. CONCRETE SHIP
TAKING DIP BOTTOM SIDE UP. FIRST AND FINAL
STAGES OF THE LAUNCH ARE SHOWN

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New York's New Canal Ready in 1918

Description of Engineering Problems Which Were Solved in Putting This New Waterway Into Shape to Handle a Huge Tonnage of Freight

By M. E. Mutchler

Concluded from December

OLD AND NEW LOCKS, LOCKPORT, N. Y.

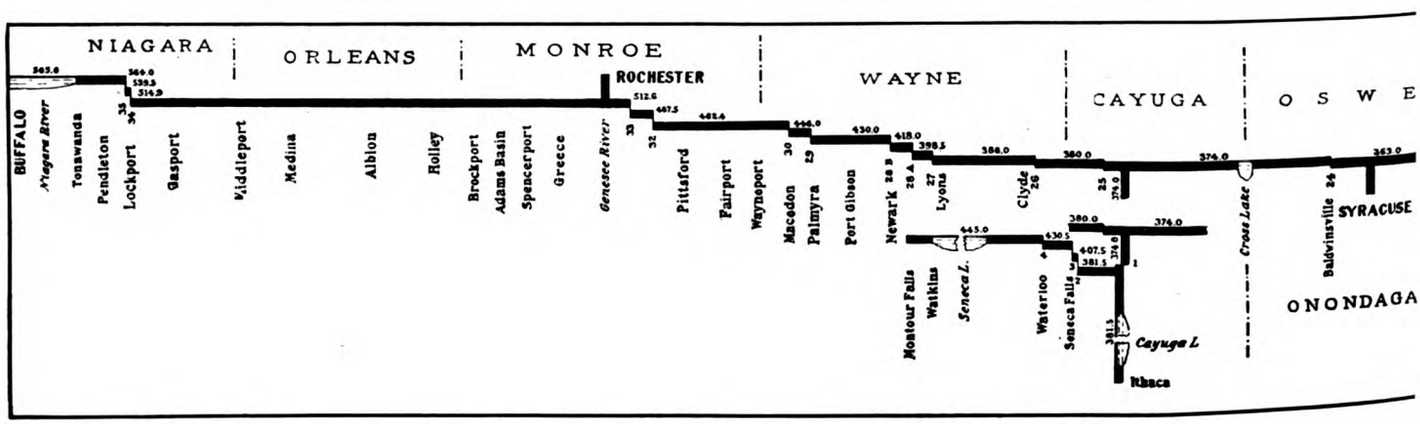
BUFFALO, the western terminus of the canal, is 565.6 feet higher than the Hudson. The land of New York state descends steadily, with the exception of the Rome summit level, the entire distance to the Hudson. To overcome the drop of 50 feet at Lockport, two great locks were necessary, these two chambers taking the place of five locks on the old canal. The original five locks are directly adjoining their successors and offer a striking contrast. The substitution of two locks, each of 25 feet lift and the use of electric power, makes a considerable saving of time over the old hand operated chambers.

From Lockport the canal makes a very gradual drop of 2.3 feet to Rochester, thus giving a steady flow of water in the canal, to the east. From Rochester the drops, by means of locks, are more or less frequent and gradual until the Rome Summit level is reached. Here shortly after passing between the beautiful scenic shores of Oneida lake, the canal rises two flights of locks, from 369.9 feet, the altitude of Oneida lake, to 420 feet above the Hudson river. Thereafter boats drop steadily to Waterford, 184 feet above the river. Five great flights at this point, at the largest set of locks on the entire system, deposit the boat nearly 200 feet to the Hudson.

Gigantic Constructions Necessary

Some of the most notable engineering work on the entire canal was done at Seneca Falls. Before being canalized, the Seneca river here had a natural fall of 49 feet, and a series of three dams, which furnished power to 13 different concerns. A single dam was built by the state to replace the three in the ravine, raising the water level in the river 50 feet, creating a lake and wiping out a village, as well as the power plants of the 13 interests. These are now given power supplied by the new dam, the state using the surplus to operate two locks at Seneca Falls.

The Oswego canal, which meets the main waterway at Syracuse and flows in a northwesterly direction to Oswego, on Lake Ontario, is possibly the most important branch of the great 790-mile system. Tre-



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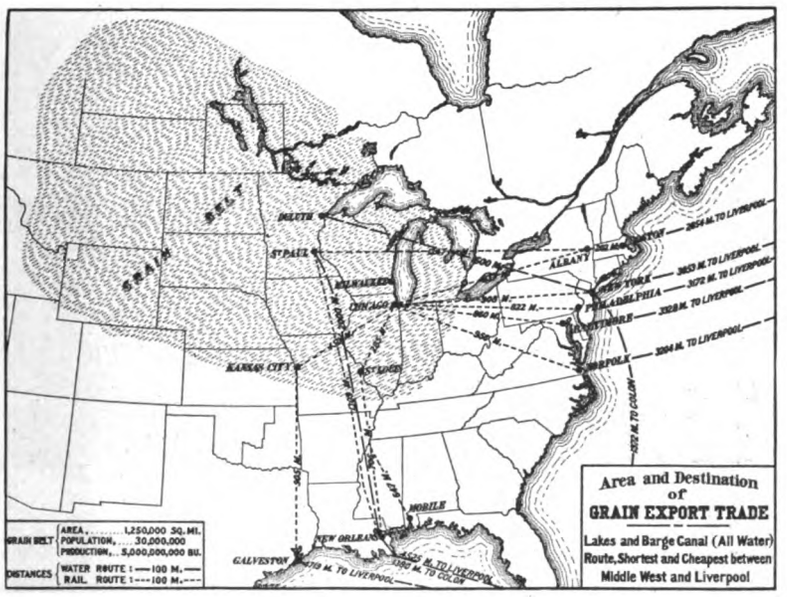
mendous traffic is expected to be carried on through the Oswego canal, and its lake terminus. At Oswego a breakwater constructed by the United States government protects the terminal pier designed for the transfer of freight from lake vessels to barges. This pier, which extends out into the lake for some distance, is now ready for use. The river terminal also has a dockwall and terminal, and freight handling machinery. In the City of Oswego is the only siphon lock on the canal, which fills the lock chamber in five minutes and empties it in six.



On the Oswego river, at Phoenix, is a magnificent bridge over the stream, of the double-leaf bascule type, each span 140 feet long, operated by electricity so that the mere shifting of a lever raises and lowers the two immense spans. The electricity used for the operation of the spans is purchased from the local generating company, and is one of the few plants on the barge canal where electric power is bought for such purpose instead of being generated by the state from the water power of the canal.

At Minetto, on the Oswego, are also a highway bridge, 700 feet long, and an immense gravity dam lock. A power plant has also been built at this point.

The canal goes through Onondago lake to reach Syracuse, in much the same manner as at Seneca and Cayuga lakes; in fact, as said before, the entire barge canal system instead of being a big ditch like the original Erie canal, is a series of deep channels through lakes and rivers, and beds of streams formerly dry in summer and full at floodtime. The terminals at Syracuse are nearly a mile south of the tip at Onondago lake.

Oneida Lake is a Pretty Section

A pretty section of the canal is that portion running through Oneida lake. Here the waterway broadens out in delightful contrast to the comparative confinement of the artificial stream and wonderfully increases the speed of the powered barge. The terminal harbors at Constantia and Cleveland on the lake will form safe havens for boats in time of storm on the lake. Rome and Utica, where the canal is now practically ready for navigation by barges ten times as large as the old 250-ton canal boats, are on one of the highest parts of New York state, along the route of the Erie canal. Just north of Rome the waters of the upper Mohawk river are impounded in the massive Delta reservoir, where the hamlet of Delta formerly stood. The dam constructed at this reservoir is 1100 feet long with 300 feet of spillway near the center; at its highest part the dam is 100 feet above rock; the overfall from crest to foal is about 70 feet; the water in the pool being 10 feet deep to absorb the shock of the fall. The bigness of this great storage basin, 4½ square miles large, can be appreciated when it is known that at high water the reservoir is 70 feet deep and gets its supply from a watershed of 137 square miles.

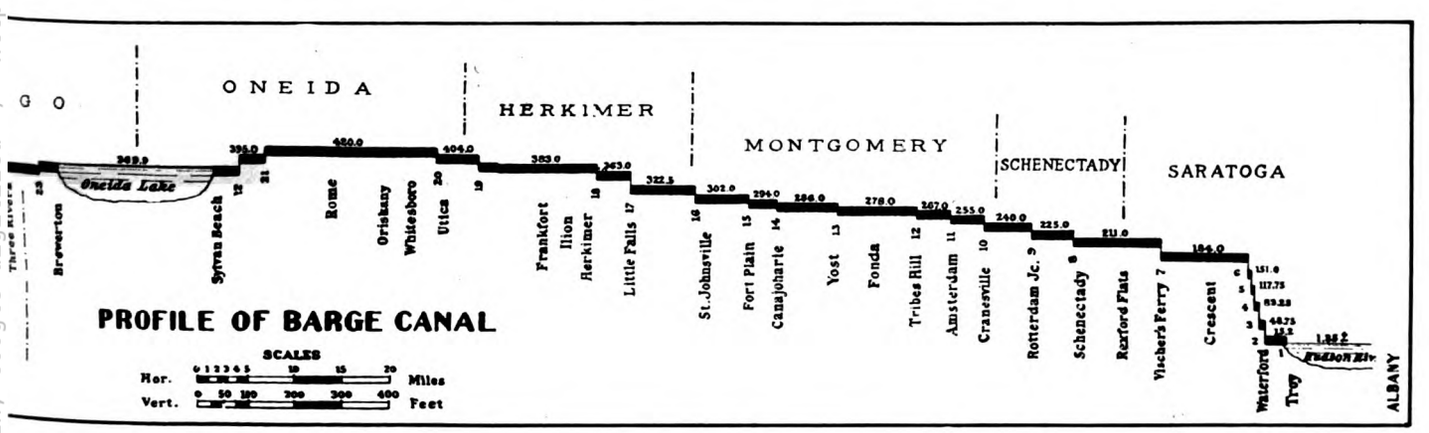
The other basin formed by a 300-foot dam across West Canada creek, near the village of Hinckley, has a spillway 400 feet long and is even higher than the Delta dam, but the water is deeper and drains 372 square miles of the slopes of the Adirondack mountains.

Water Guided into Channel at Trenton Falls

As the Mohawk valley is reached by West Canada creek, in the vicinity of Herkimer, the water meant for the barge canal is turned at Trenton Falls into an artificial channel nearly six miles long to the Rome Summit level, near Oriskany.

Beyond Rome and Utica, terminals of concrete with modern derricks and freight-handling devices have been placed at Frankfort, Ilion, Herkimer, and Little Falls, at St. Johnsville, Fort Plain, Canajoharie, as well as at Fonda and Amsterdam.

At Schenectady, while the dockwall and terminal



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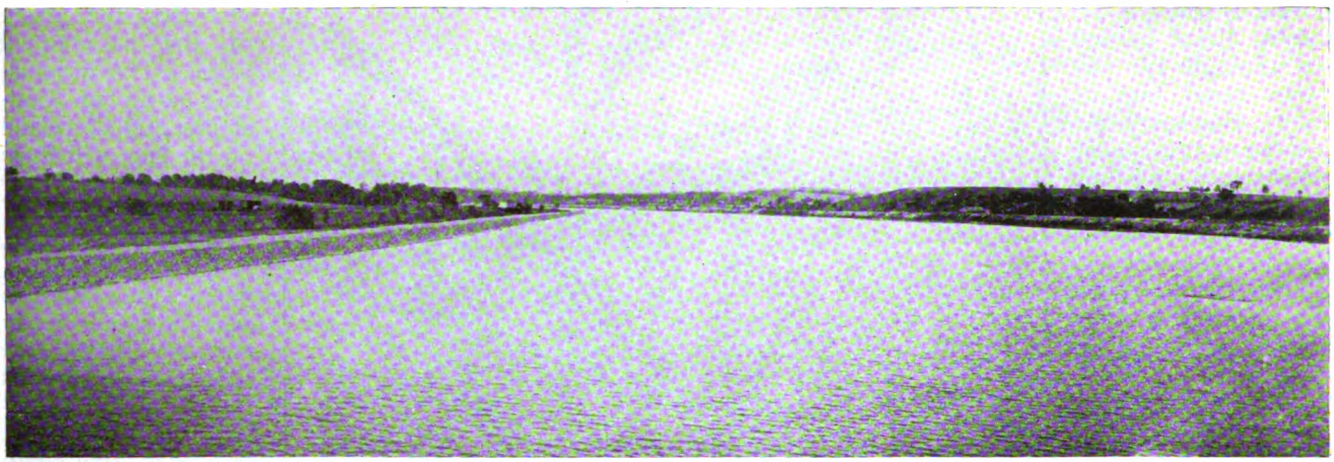
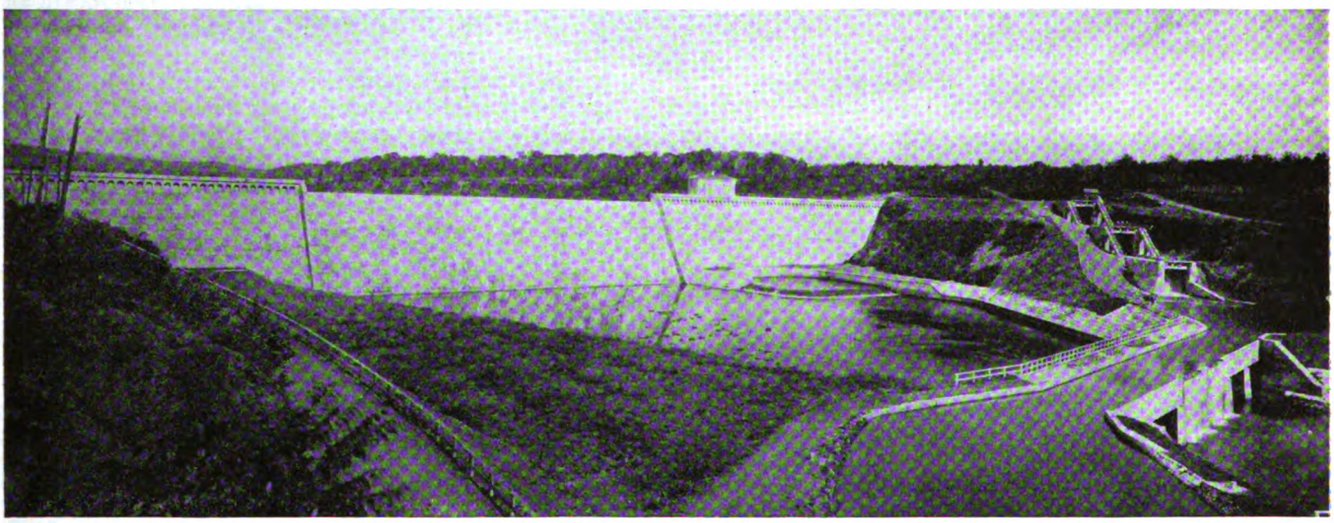
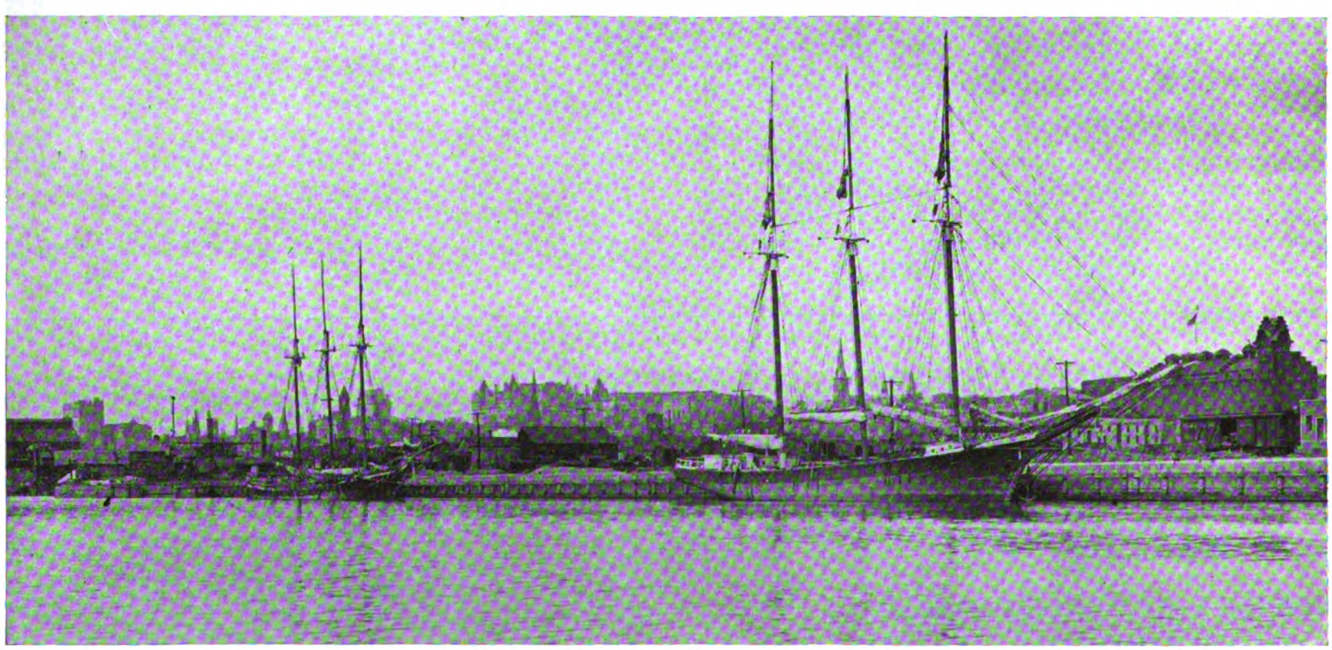


WIDE WATERS AT NEWARK, N. Y.



DELTA DAM—A SAMPLE OF THE WONDERFUL ENGINEERING WORK ON THE NEW BARGE CANAL



SCHOONERS UNLOADING AT THE ALBANY TERMINAL, BARGE CANAL

By removing the masts and installing power, vessels of this type could easily navigate the Barge canal and make port at any of the big Lake cities

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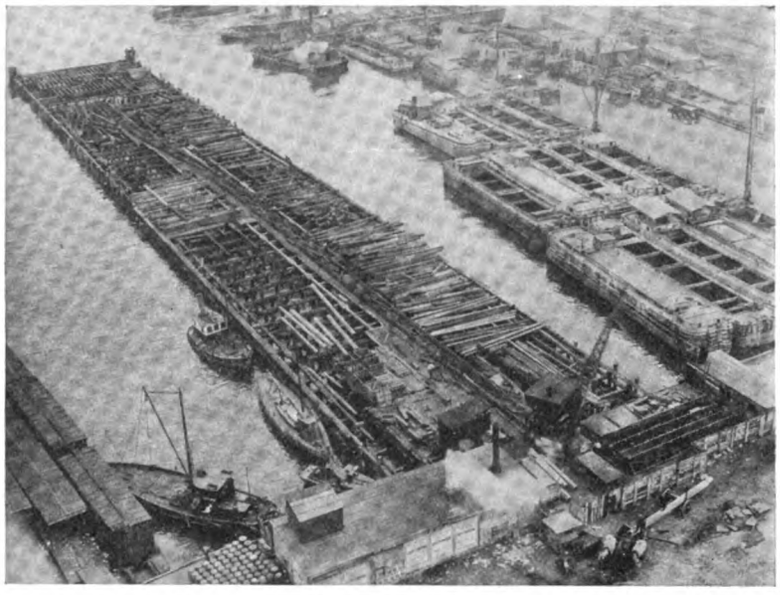
were completed some time ago, special arrangements had to be made for the freight-handling machinery, on account of very heavy castings manufactured at this teeming industrial center.

It has been rumored that the American Locomotive Co. plant, located here, expects to construct special barges that will enable the company to load locomotives for direct export from the plant aboard these boats. By sailing the canal and the Hudson to tidewater, the shipments can be loaded into ocean steamers with no rehandling, and at minimum cost. Other firms along the system will follow this means of quick and convenient transit to the coast.

After passing Amsterdam eastward, barges enter the canalized Mohawk river, through scenic beauties hard to surpass anywhere in the country.

Crescent, Cohoes and Troy now have their terminals, the Trojan City having two, the upper at a point above the Government dam and the lower on the east bank of the Hudson. While Troy is the end of the Erie canal proper, the Hudson river having been canalized down to that city, the real eastern terminus of the Erie canal is at Waterford, where the canal waters enter the Hudson by means of the Waterford flight. Here occurs a series of five great locks, with a lift of 184 feet, or 14 feet higher than that of the entire Panama canal. This exceptionally high lift was necessary to pass the canal around Cohoes falls and the dam at Cohoes. The five locks replace the 16 small locks of the old canal.

Barges can go up or down this great flight in about an hour and a half, as against eight hours through the old 16 locks. Here boats enter or leave the Hudson river.



PIER 6—NEW YORK TERMINAL OF THE STATE BARGE CANAL SYSTEM IN PROCESS OF CONSTRUCTION

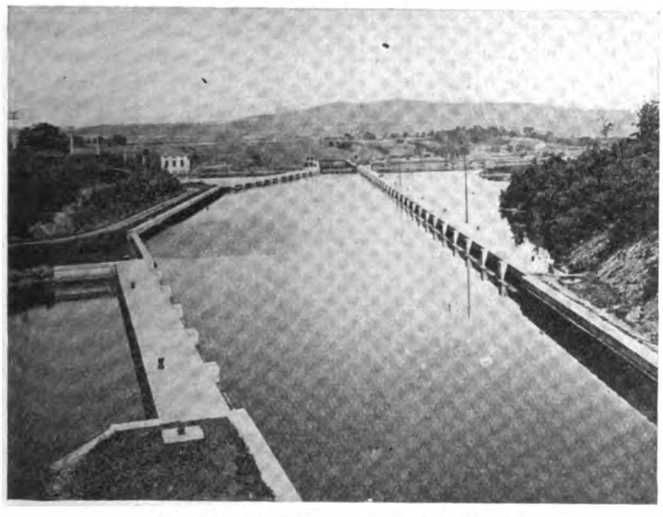
The Champlain Canal

Running north of Waterford is the Champlain canal branch of the system, connecting with Lake Champlain at Whitehall, passing Mechanicsville, Stillwater, Schuylerville, Port Miller, Fort Edward, Glens Falls (by spur or feeder) and Fort Ann, on its way north. The Champlain canal, which is now in operation, is the result of the canalization of the upper Hudson river from Waterford to Fort Edward. From the latter point northward the canal follows Bond and Wood creeks, so that lock construction might be saved and no interference would be made with navigation on the old canal.

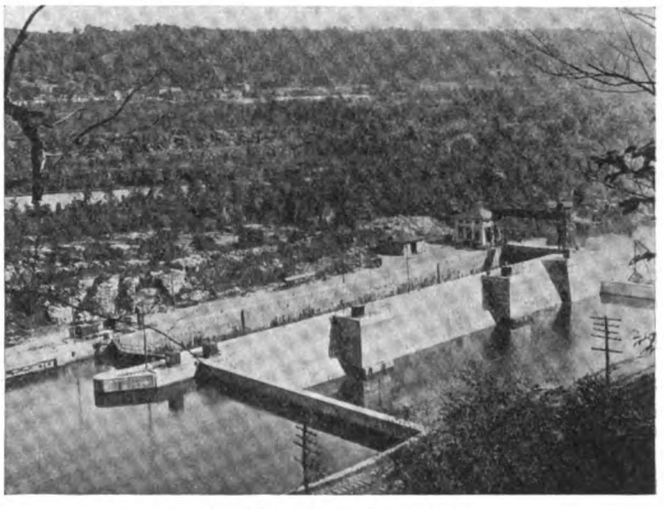
The lock at Whitehall, which is the entrance to Lake Champlain, was one of the most difficult pieces of engineering work on the entire barge canal. This new lock was built in the same location as the flight of three locks in the old canal, but the work was done without interfering with navigation. A movable dam and siphon spillway were also built here to control Wood creek floods; flood conditions are now improved to the extent of 10 feet.

Where formerly an hour was needed to pass into Lake Champlain from the canal, the time now consumed is seven minutes. In this part of the Champlain canal, a tug now takes a fleet of as many as 20 boats along at twice the old rate of speed, made by one boat towed by three mules.

Barges after passing into the Hudson at Waterford can proceed at their best possible speed through the broad river channel to New York and seaboard. Both Manhattan and Brooklyn are provided with newly erected terminals for the loading and unloading of



FINISHED CANAL AT WATERFORD



THE LITTLE FALLS LOCK

This lock is the highest on the Barge Canal, having a lift of 40½ feet—View shows the structure from the upper gate

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HINCKLEY DAM AND SPILLWAY

freight. The most modern freight-handling devices are being installed for the quick dispatch of commodities.

Gowanus bay channel has lately been improved by the federal government, at a cost of more than two million dollars.

Co-Operation from the Railroads

Joint class rates have been published for the first time in the history of state canals, providing a through rate at "less than rail cost with better than rail service", according to a statement issued by State Superintendent of Public Works Wotherspoon at Albany, N. Y. The through rates are from all points on the improved canal to Cleveland and Detroit.

The rates apply by way of the lines of the Shippers' Navigation Co. of Syracuse, N. Y., in connection with the Cleveland and Buffalo Transit company, and the Detroit and Cleveland Navigation company.

General Wotherspoon has said that the publishing of these joint canal and lake rates is the first step in a determined effort to open up the territory tributary to the waterway and remove obstacles that have prevented shippers from using the canal.

It is stated that the absence of through rates has contributed largely to the decline of canal commerce. Arrangements are now being made to publish, soon, through rates by the new barge canal and the various railways connecting with it.

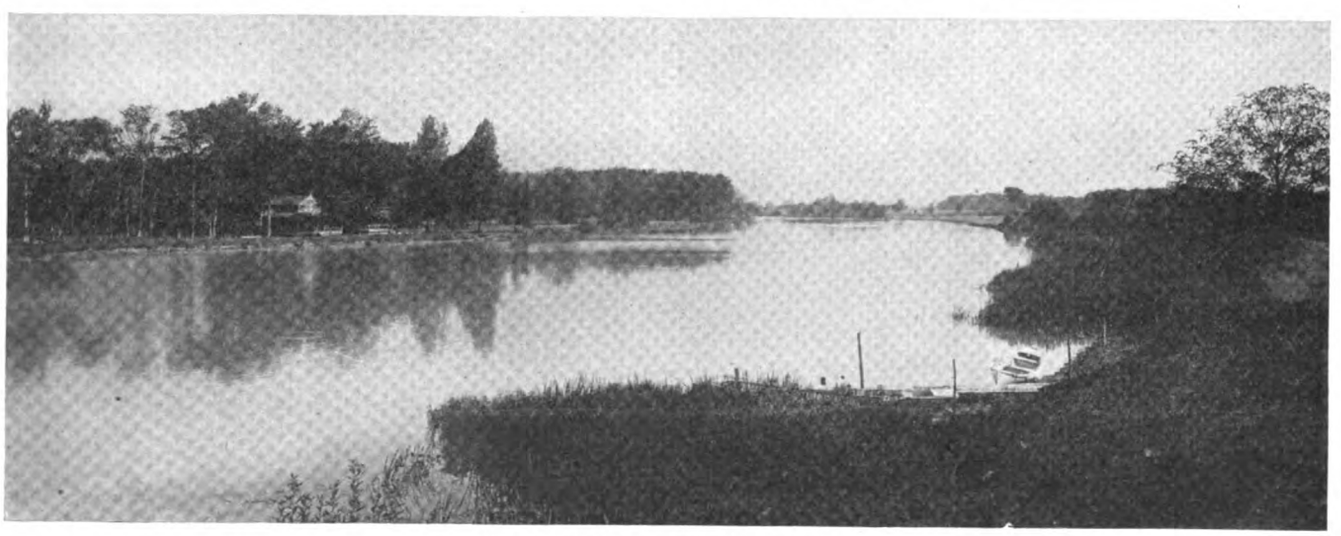
"Ere this season has passed, or at least before another season opens, shippers are assured that the canal can be utilized as a part or all of the route for the movement of their traffic to almost any territory in the country," General Wotherspoon said.

One-week deliveries between New York, Detroit and Cleveland are possible under the new arrangement. The schedule of the canal line calls for six-day service between New York and Buffalo and the lake lines give an overnight service.

Gen. Wotherspoon Urges Use of Canal

General Wotherspoon, who was former Chief of Staff of the United States Army, when in Washington recently, conferred with members of the general staff and members of the National Council of Defense. He urged that the state waterways be utilized to their fullest extent in relieving congestion on rail lines and in expediting the movement of food supplies and war materials from the Great Lakes to points on the Atlantic coast. At that time members of the council promised their support in a campaign to use the canal for increasing the amount of freight transported across the state.

General Wotherspoon believes that a large amount of the tonnage of grains for food use, now held in Buffalo and other lake ports, can be easily hurried to the east through the canal by the employment of new lines of self-propelled barges.



BARGE CANAL AT THREE RIVERS

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How Wooden Ships Are Built—VIII

Planking the Ship—Steaming Planks and Marking Frames—Beveling Keelsons—Keelson Construction—Ceiling the Ship

By H. Cole Estep

AFTER the frames, stem, sternpost, etc., are all set in place, the ship is ready to be planked on the outside and ceiled on the inside. The keelson construction on the inside also can be finished. Next to the frames, the exterior planking probably is the most important part of the ship's structure. In the old days, the planking of large ships was divided into a number of distinct assemblies each with a special designation. Old-line wooden ship builders accordingly were familiar with such terms as sheer strakes, channel and middle wales, black strakes, main wales, diminishing planks, plank of bottom, and garboard strakes. These names are given in the order of the respective assemblages, beginning at the topside. In the old warships, the sheer strakes were situated between the plankshеer or covering plank and the ports of the main deck. Below the latter, as far as the ports of the middle deck, the external planks were termed channel wales, as they received the fastenings of the chain plate and preventer bolts of the channels. The middle wales were situated between the ports of the middle and lower decks, while the planks immediately below the lower deck ports were termed black strakes, owing to the fact that their upper edges formed the boundary line of the portion of the ship below the fighting decks, which was painted black. From the main wales, the planks gradually diminished in thickness to that of the plank-of-bottom strakes. The strakes in which taper was worked were known as diminishing plank. The plank-of-bottom extended from the diminishing plank to the garboard strake, the lower edge of the latter rabbeting to the keel. The planks between the ports were termed short stuff, being specially designated according to their situation as short stuff between main deck.

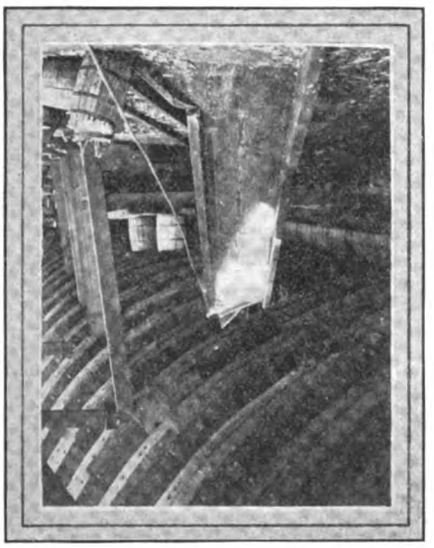

FIG. 131—TIMBER CHUTE FOR HAULING CEILING STRAKES AND KEELSONS INSIDE THE SHIP

Modern ship builders have forgotten all about these terms and at the present time about all we hear of are garboards, bottom plank and topside planking. In some cases bilge planking is mentioned. The planking usually is arranged in a series of strakes of diminishing thickness, the garboard strakes adjoining keel being thickest. Before starting in to plank a ship, a disposition of the edges and butts

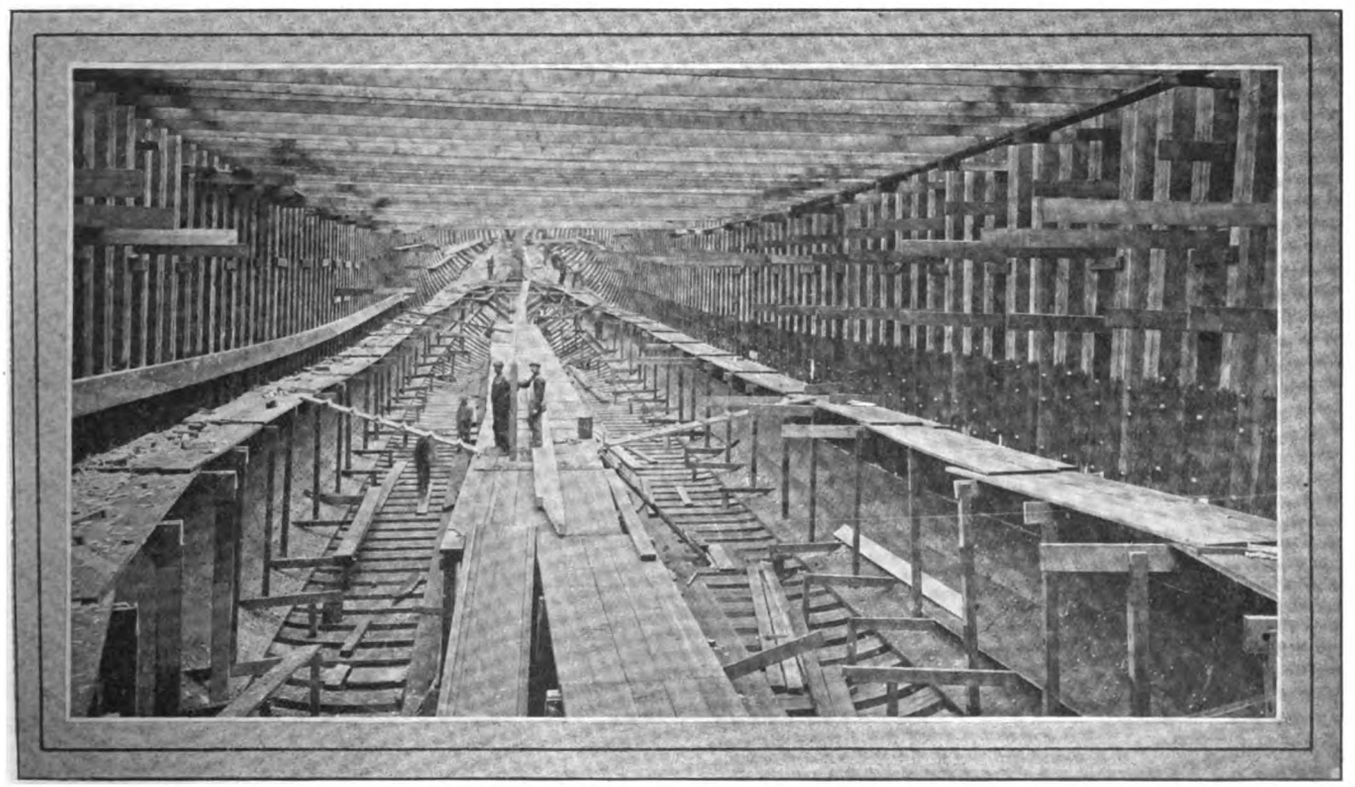

FIG. 132—INTERIOR OF A WOODEN SHIP UNDER CONSTRUCTION SHOWING TIMBER CHUTE, SCAFFOLDING AND BILGE CEILING IN PLACE

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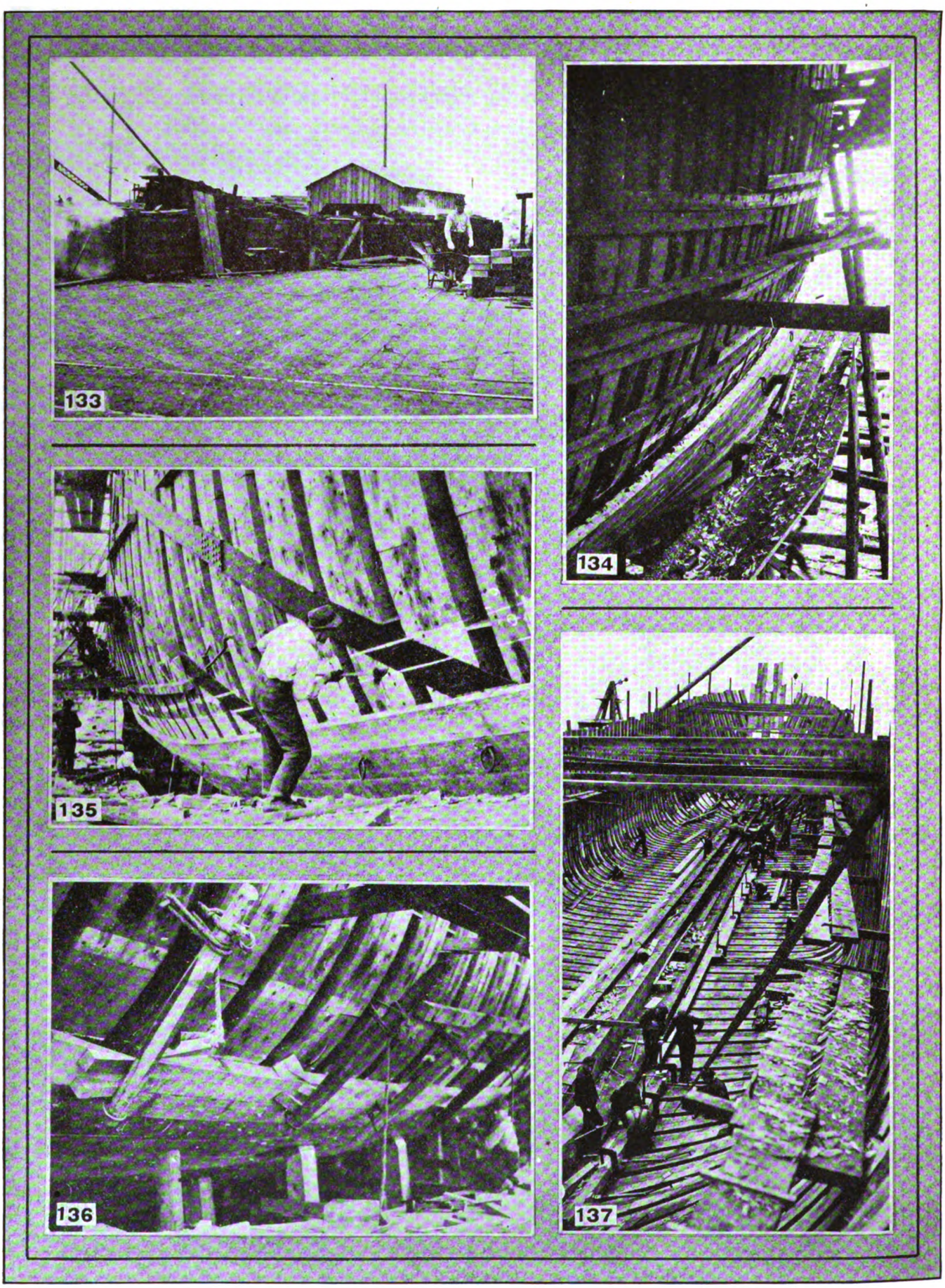

FIG. 133—STEAM BOX FOR SOFTENING PLANKS. FIG. 134—SIDE OF SHIP WITH PLANK IN PLACE. FIG. 135—DUBBING-OFF AND RASING LINES ON SHIP'S SIDE FOR PLANKING. FIG. 136—CLAMPING PLANK IN PLACE PRIOR TO SPIKING. FIG. 137—CLAMPING CEILING STRAKES IN PLACE PRIOR TO BOLTING

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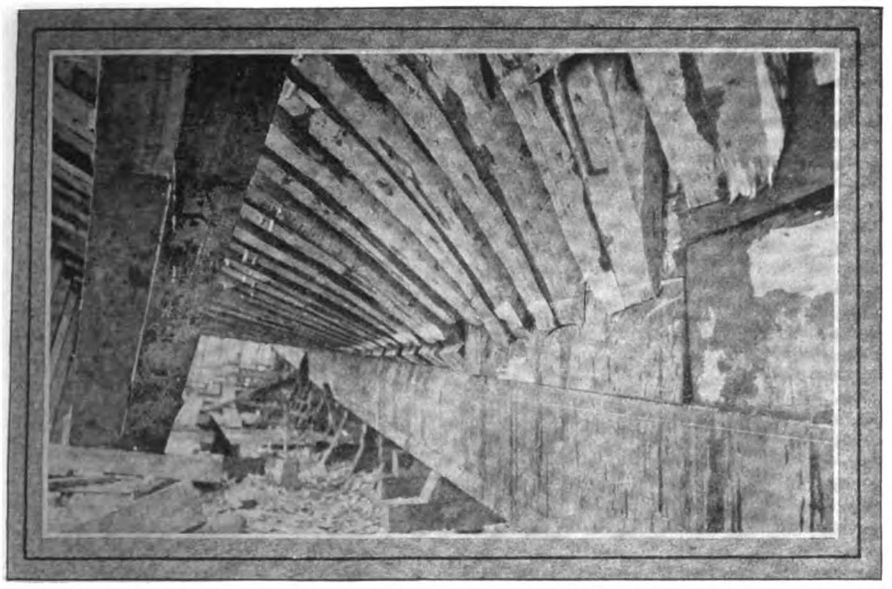

FIG. 138—LOWER ENDS OF STERN FRAME AND DEADWOOD RASED FOR PLANKING

should be prepared and set off on an expansion drawing. If care is taken in arranging disposition of the planks, considerable work can be avoided. Planks between the main deck and the keel should be filled up in such a way as to give the least possible twist or curvature, thus simplifying the conversion of the material and work of securing the planks in place.

In a full-bodied ship it will be found impossible to continue the same number of planks right fore and aft, owing to the difference between the girth amidships and at the extremities. In every case, in fact, there is a considerable reduction in the breadths of the planks before they terminate at the stem or stern. When it is necessary to reduce the number of planks for the reason just mentioned, the last plank of the strake which does not extend right fore and aft, as the case may be, which is termed a stealer.

The lengths of the planks should be as great as can be obtained. In England three strakes are placed between consecutive butts on the same frame. This practice is not followed in the United States, where one strake in many cases is considered sufficient. Two, however, is better practice. The butts also should be disposed so as to avoid the succession suggested by the name ladder step.

Lloyd's rules do not permit the butts to be nearer than 5 feet from each other, unless there is a strake wrought between them and then a distance of 4 feet is allowed. No butts are permitted on the same timber unless there are three strakes between them. In ships with extreme proportions the figures six and five are substituted for five and four, respectively.

In most yards in the United States, the vessel is planked from the keel upward. Sometimes, however, the garboard strakes and the wales at the top are first put on and the planking then proceeds from both top and bottom toward the bilges.

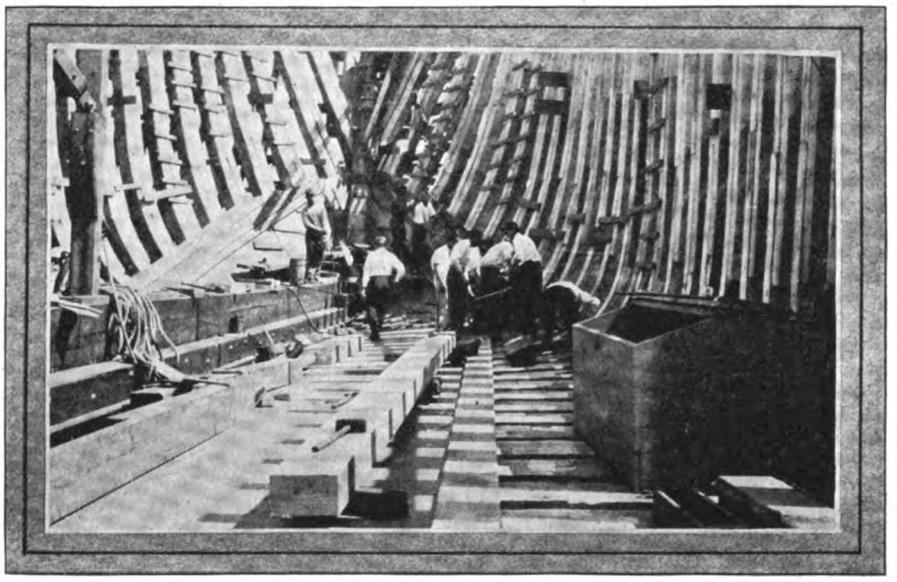

FIG. 139—CEILING A SHIP IN A GULF COAST YARD

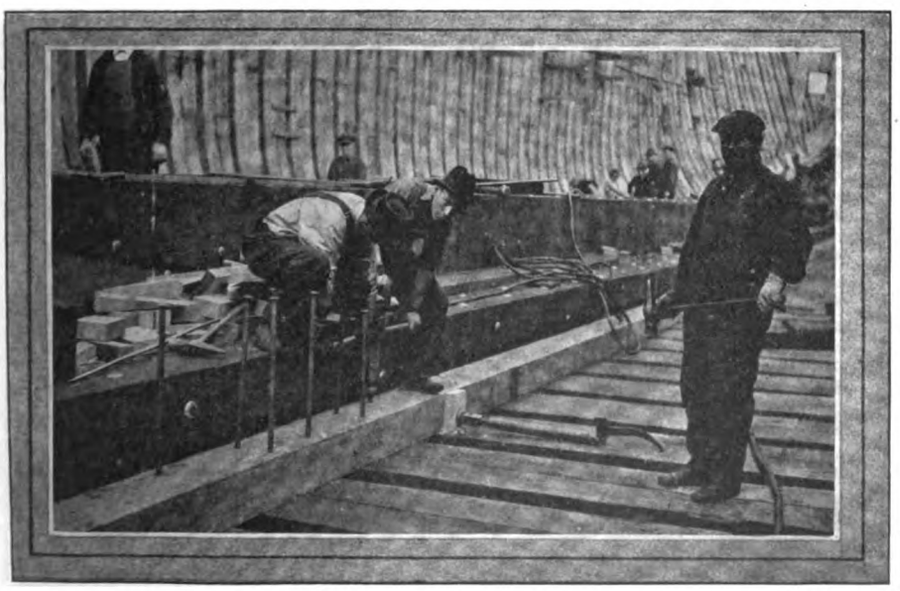

FIG. 140—BOLTING DOWN KEELSON TIMBERS WITH PNEUMATIC HAMMERS

Before working the planks, the lines of their edges are rased in on the frames by means of battens bent in the position indicated by the expansion drawings. Fig. 138 shows how these lines are rased on the keel and lower ends of the frames and after deadwood. Fig. 135 shows how the lines are rased on the frames amidship. The latter illustration also shows how the frames are dubbed-off to a fair surface before the planks are spiked in place. The dubbing-off operation is performed by skilled workmen using an adz. It is a rather expensive process and recently some interesting experiments have been

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made with a machine designed to perform this operation. This machine, a portable electrically driven planer, with circular knives, works something on the principle of a lawn-mower. It is said to save a tremendous amount of time in dubbing-off the outer surface of the ship.

A True Shear Necessary

Care must be taken in rasing in the lines shown in Figs. 135 and 138 that the front or sight-edge of the plank is the line drawn, as at the bow and buttock where there is a considerable twist in the surface, a very unsightly edge and not the true sheer would be obtained if this precaution were not observed.

The edges of the planks are trimmed square to the surface of the timbers, this being expressed in technical language by saying that the "closest edges stand between two squares". A little deduction is made from this angle to allow for the caulking seams. Usually it amounts to 1/16 inch to every inch of plank thickness, when the plank does not exceed 6 inches in thickness, which is rare in modern shipbuilding. One method of determining the seam adopted by workmen is to set the two arms of a 2-foot rule ⅝ inch apart at their extremities. This gives rather less than 1/16 inch of seam for every inch in the thickness of the plank, the diminution being, however, only about ⅛ inch in 12 inches.

For the extremities of the ship and on the bilges it is necessary to soften the planks by steaming them in a steam box provided for that purpose. A box of this character is shown in Fig. 133. It is 90 feet in length and about 6 feet square, built of large timbers edge-bolted together and caulked. The necessary steam is supplied at low pressure by an ordinary donkey boiler fired with refuse wood from the shipyard. In many yards the hot plank is often transferred from the steam box to the ship by hand. In most Pacific coast shipyards a gang of 12 men is employed for planking the ship. A gang of this sort, with some additional labor, should be able to plank up one strake a day clear around a 275-foot ship from the keel to the bilges. From this point up to the rail the planking should proceed at the rate of two strakes per day, allowing 35 days altogether to plank the ship.

Putting on the Plank

The necessary holes for the fastenings are bored in the plank before it is brought out to the ship. After being lifted into place, the plank is tightened into position by means of chains, shores and wedges in the manner shown in Fig. 136. Before the plank is clamped in place, the bottoms of the holes which are to receive the spikes are reamed out with a hand auger so the spikes may be set easily. The plank is first tacked or stuck in position with 10-inch galvanized boat spikes which are driven by hand. Two spikes are driven at the ends and one in between on every frame. After these spikes are driven, the shores and wedges may be removed. The ring bolts also can be taken out, leaving the planking as it appears in Fig. 134. It is now ready to receive the final fastenings which usually consist of locust treenails and iron drift-bolts.

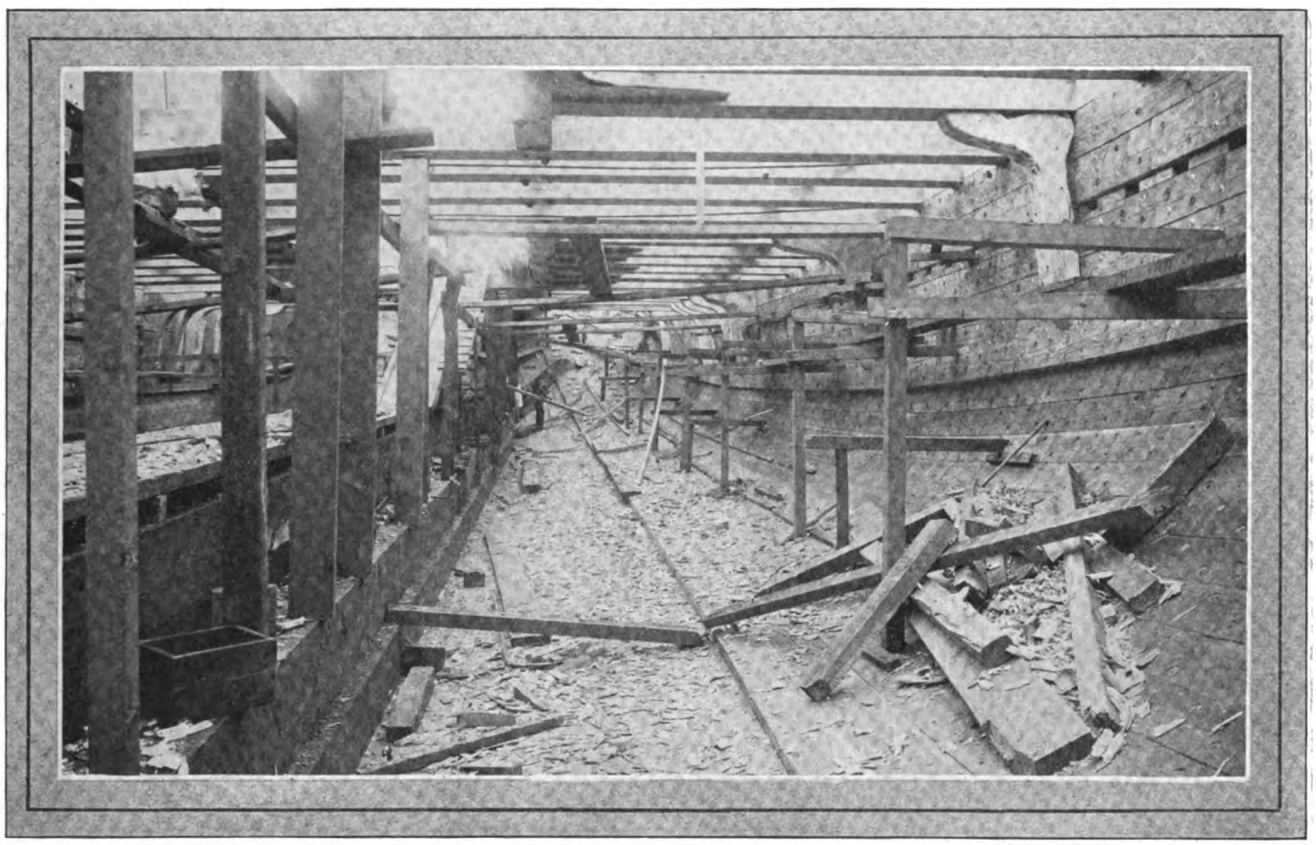

FIG. 141—PORT SIDE OF A WOODEN MOTOR SHIP COMPLETELY CEILED

The treenails, which are about 26 inches long and 1¼ inches in diameter, are driven into holes bored a scant 1¼ inches. After they are driven home, they are wedged on the ends and in some cases caulked. Special care is required in driving treenails in order to avoid trippling them, as in this case it is impossible to drive them any further and they must either be driven or bored out and their places supplied by others which generally are less efficient than if driven through in the first place. Treenails should be of well-seasoned sound locust or oak cut with the grain.

There is a considerable difference of opinion regarding the comparative value of treenail and drift-bolt fasten-

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FIG. 142—BEVELING KEELSON TIMBERS BY HAND. FIG. 143—MAKING A SCARF IN A KEELSON TIMBER. FIG. 144—THE FIRST STEP IN BUILDING UP A CENTER GIRDER-KEELSON. FIG. 145—CLAMPS USED FOR TEMPORARILY SECURING KEELSON PIECES. FIG. 146—BORING DRIFTBOLT HOLES IN CENTER GIRDER-KEELSON. FIG. 147—CENTER GIRDER-KEELSON NEARLY COMPLETED

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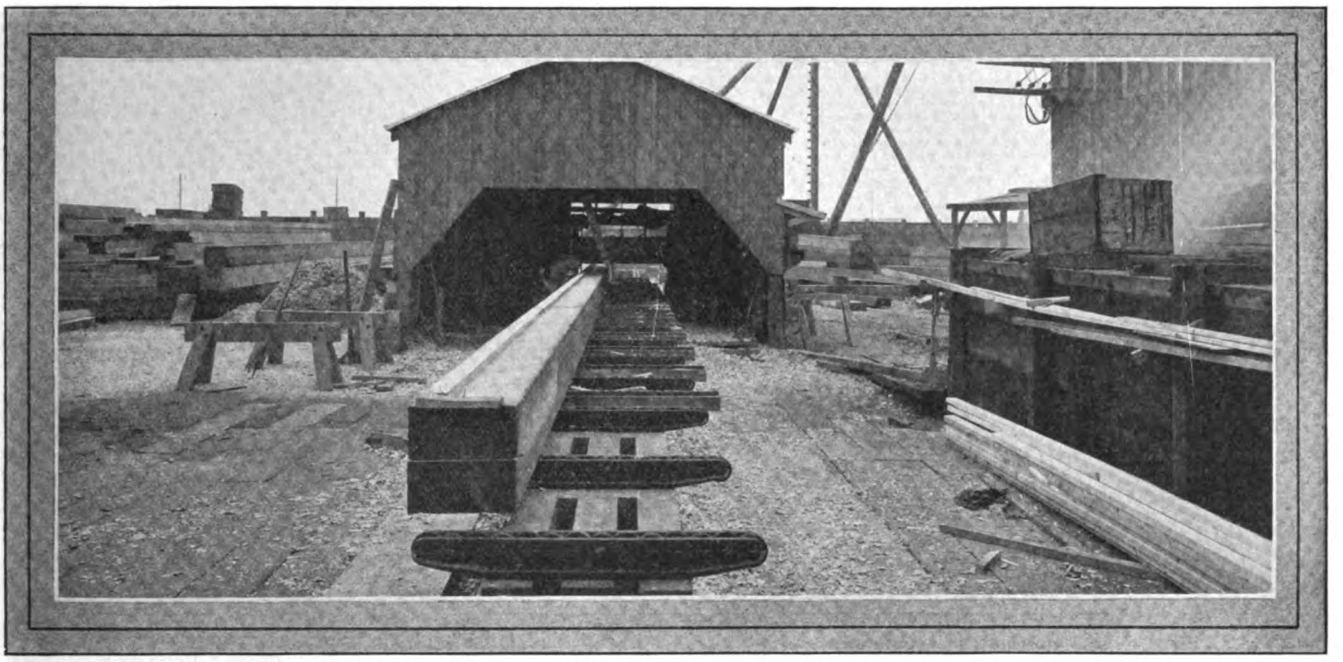

FIG. 148—CEILING STRAKES ON TABLE OF AUTOMATIC BEVELING MACHINE—NOTE BATTEN ALONG TOP WHICH INDICATES THE AMOUNT OF BEVEL

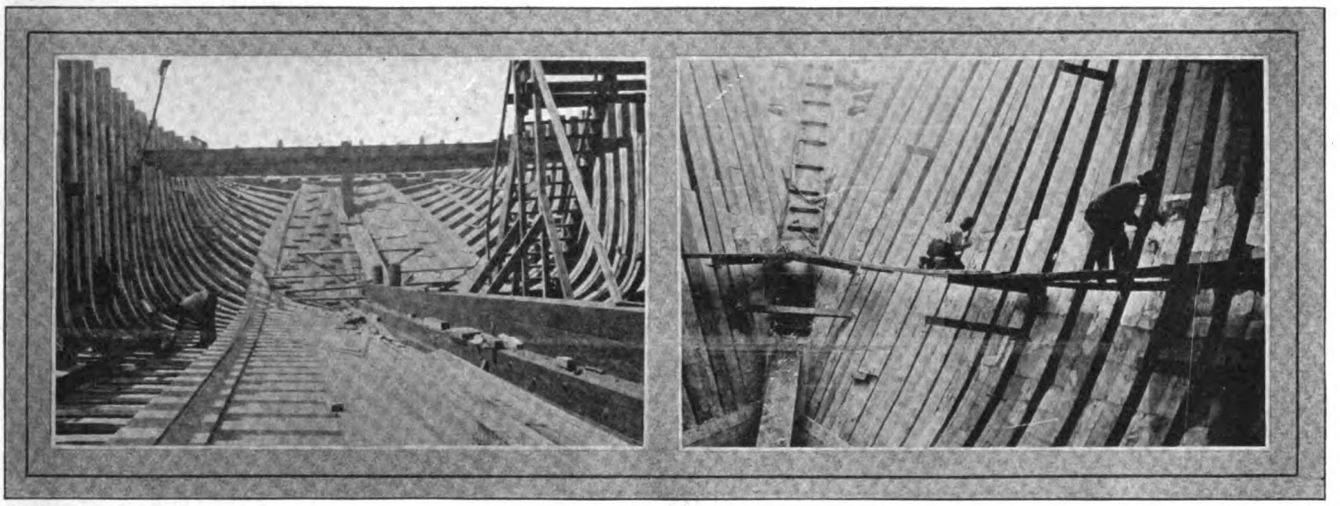

FIG. 149—IN SOME YARDS THE CEILING IS LAID IN PARALLEL STRAKES BETWEEN THE KEELSONS AND THE BILGE.
FIG. 150—DUBBING-OFF THE INSIDE PREPARATORY TO CEILING

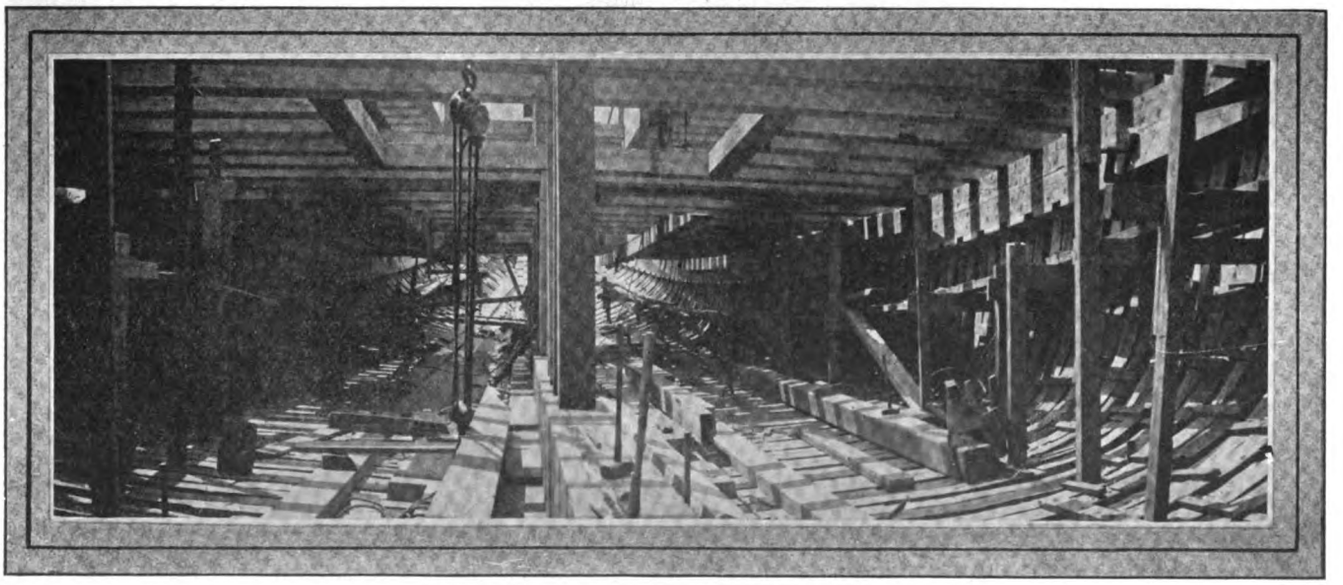

FIG. 151—KEELSON CONSTRUCTION OF A SMALL MOTOR SCHOONER

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ings. Some modern authorities incline to the opinion that treenails are practically worthless. Nevertheless, they are very largely employed. An English authority expresses himself on this subject as follows: "The superior lightness and cheapness of the treenail are obvious, but their superiority in point of strength is questionable. There is no doubt but that a well-made and tightly-driven treenail, of sound, seasoned oak, possesses considerable holding power when caulked at both ends; and it is not subject to the deterioration due to the action of the acids in the timber, which is so common with iron fastenings. But when the inferior resistance to sheering, the weakening of the frame timbers caused by boring such large holes as treenails require, also their tendency to draw in the process of caulking the plank are all taken into account, there is undoubtedly a large margin of efficiency in favor of the through metal fastenings. When the latter are of copper or mixed metal, the inferiority of the treenail is established in all respects, except as regards cost and weight. The clauses in Lloyd's rules referring to this subject are probably founded on these conclusions."

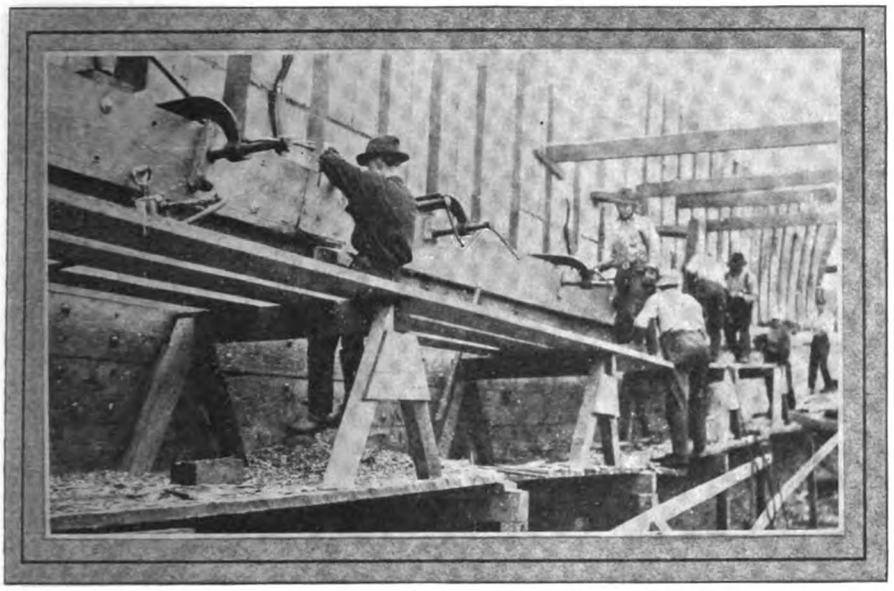

FIG. 152—CLAMPING AND BOLTING UPPER CEILING STRAKES IN PLACE

Using More Metal

It might be stated that American ship builders rarely, if ever, employ copper or mixed metal fastenings, owing to their excessive cost. Gradually, however, ship builders are using more and more metal drift bolts and spikes in place of treenails on account of their superior strength and holding power.

According to Lloyd's rules, the builder is at liberty to decide what proportion of his fastenings shall be treenails, being restricted only as regards the butts, each of which must be fastened by two bolts, one of which should extend through and be clenched. A year is deducted from the ship's period when the latter condition is not fulfilled. It should be observed that one of these bolts is placed through the butt timber and the other in the timber adjacent to it. The rules require further that two-thirds of the bolts and treenails shall be driven through, the former being clenched on rings on the inside, and the latter caulked and wedged on the outer plank and ceiling.

Before setting off the fastenings, it is necessary to bore off from the inside of the ship all of the through fastenings for shelves, waterways, beam, knees, etc., and to indicate by chalk marks on the planks where the steel straps and other iron work are situated so that the fastenings may be set off clear of them. When the positions of these fastenings are discovered, then the remainder of the fastenings of the planks can be set off.

As previously stated, the edges of the planks are rased on the timbers in order to be sure that they will conform to the sheer of the ship, thus assisting in giving her a graceful appearance. In this connection, it may be noted that if a wide batten, termed a spiling batten, be bent around the ship's side, especially at the bow and stern, it will be found that it will not bend to the curves of some of the lines. The latter are sometimes either convex or concave with reference to the upper edge of the spiling batten. In the former case the edge is said to have sny and in the latter, hang.

Determining Sny and Hang

Now the first operation in taking account of a strake of planks is to determine the amount of sny or hang in the edge of the adjacent plank against which the plank to be trimmed must be fitted. This may be accomplished in the following manner:

Bend a spiling batten fairly upon the timbers just above and as near as possible to the upper edge of the last plank in place so that the edges of the batten are unrestrained. Now choose a certain number of beveling and spiling spots, say, one at every frame stage, and mark them both upon the batten and the timbers. Then measure the distance from the lower edge of the spiling staff to the upper edge of the plank at each of the spiling spots. Transfer the spiling

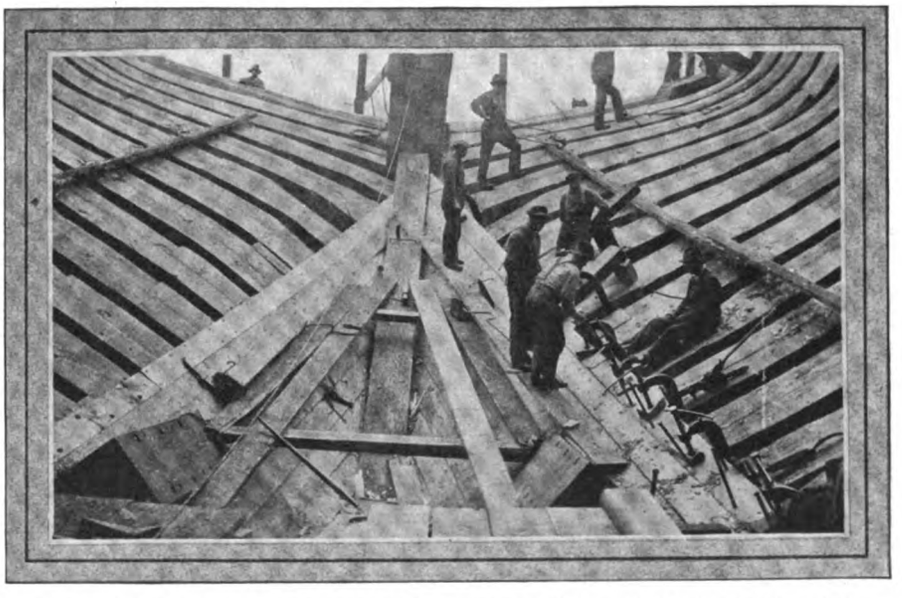

FIG. 153—CEILING A SHIP IN THE WAY OF THE STERN, SHOWING THE USE OF CLAMPS

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spots to the plank. Now bend a batten to pass through the points thus obtained and so draw the line of the inner lower edge of the plank. The upper edge is obtained by measuring on the plank the distance to the line of the upper edge rased upon the timbers at the several spiling spots. These breadths should be set off at the respective spiling spots on the planks and a curve passed through the points. The planks may now be trimmed to a square beveling minus half the allowance for the caulking seam.

In case the strake is a shutter-in, or the last strake to go in place, the spilings for the width may be taken by means of small pieces of stick cut so as to fit tightly between the two strakes, close against the timbers. The breadths of the plank at the several spiling spots are set off by means of these sticks. The bevelings of the upper edge are obtained in the same way as those of the lower. In case the plank is the last one to complete a strake and is therefore a shutter in lengthwise, an addition to the foregoing precaution is necessary. In this case it is advisable to leave one butt uncut until after the plank is nearly bent and shored in place, the other butt being driven home closely against its neighbor. Now bend a light batten and measure the girth of the ship against the timbers, from the last point where the plank touches them to the butt of the adjacent plank of the strake against which the butt about to be cut must fit, and mark the latter point on the batten. Then, still keeping the first end of the batten fixed, let it spring along the inner surface of the plank and mark the point upon the latter. Cut the butt at this point.

Keelson Timbers

Keelsons are made from long timbers similar to keel pieces. In some yards they are bevelled by hand, as shown by Fig. 142, a skilled workman being necessary for this operation. The scarfs at the end, in cases where the keelsons consist of two or more pieces, are made in the manner shown in Fig. 143.

In some of the more modern yards, the keelson timbers and ceiling are beveled on a machine, as shown in Fig. 148. This shows two 7 x 14-inch x 80-foot timbers resting on the traveling table of the beveling machine. A batten is nailed the full length of the timbers in order to indicate the correct bevel. The side-head of the machine is set so that the bevel is cut fair with the batten. The timber is held against the side-head by means of a special roll shown in the background in Fig. 148.

This machine was designed and built by the Stetson-Ross Machine Works, Seattle. It was described in detail on page 261 of the July issue of THE MARINE REVIEW. As stated in this description, the machine consists essentially of a beveling side-head, shown at the left in the background in Fig. 148, a beveling top-head and a roller table for handling the material. The machine may be driven by individual motor or it may be connected to an existing system of line shafting. The side-head, which is mounted in a heavy yoke, is equipped with a counter-shaft provided with an automatic belt tightener. A 7-inch belt is used. This head may be tilted 30 degrees to the right and 20 degrees to the left and set in an exact position by means of a graduated scale. Most of the bevels used in wooden shipbuilding do not exceed 10 degrees. The side head is fitted with an adjustable guiding collar, which governs the depth of the cut.

Displays Remarkable Efficiency

The 48-inch top-beveling head may be tilted 15 degrees either way. It also may be raised or lowered by power and set by means of a dial that shows thicknesses to sixty-fourths. The roller table, or traveling bed, is 80 feet long. When motor-driven, a 50-horsepower motor is required. When working ceiling and planking, it is said the machine will replace 18 carpenters on the skids, the net labor saving alone amounting to over $85 per day.

After the keelson timbers and ceiling strakes are beveled, they usually are hauled up inside the ship through a chute similar to that shown in Fig. 31. An ordinary hoisting engine and ½ or ⅝-inch wire rope is used for this operation. After the keelsons and ceiling are in place, the hole left in the frames for the chute is filled up.

When the keelson timbers reach their proper position inside the hull, they are first clamped down, as shown in Fig. 137, using clamps similar to those illustrated in Fig. 145. After they are clamped in place, the timbers are drift-bolted to the floor, as shown in Figs. 139 and 140. The drift-bolts are 1 to 1¼ inches in diameter and from 24 to 30 inches in length; usually they are set by means of pneumatic hammers.

Three steps in the construction of a center girder-keelson in a 290-foot motor schooner at the plant of the Grays Harbor Ship Building Co., Aberdeen, Wash., are shown in Figs. 144, 146 and 147. This center girder consists of eight 12 x 18-inch keelsons laid on top of the rider keelson. As shown in Fig. 147, the keelsons form an arch extending up to the height of the hold beams amidship tapering down on both ends. The various sections of the keelsons are skidded into place and clamped by means of chains and wedges, as shown in Fig. 146. As soon as this is done, the holes are bored for the edge-bolts, using a pneumatic auger. The bolts are then driven and the chain clamps removed. Afterwards the timber runway, shown in Fig. 147, is taken down.

Before the ceiling or inner planking can be bolted in place, the frames must be dubbed-off to a fair surface, as shown in Fig. 150. This operation is performed by adzes, skilled men being necessary. To facilitate the dubbing-off process a temporary scaffolding is built around the sides of the vessel, as shown in Fig. 150. Two different methods of laying the ceiling are shown in Figs. 132 and 149. In the latter case, in a southern shipyard, the ceiling is laid from the keelson out to the bilge in parallel strakes. In the ship shown in Fig. 132, the bilge ceiling is first bolted in place and then the semielliptical space between the lower edge of the bilge ceiling and the keelson is filled in. The latter method generally is considered the more satisfactory, producing a stronger ship. Fig. 132 also shows the arrangement of the scaffolding for fastening the ceiling strakes to the upper part of the inside ship.

Fig. 152 shows how the ceiling near the main deck is clamped and bolted in place. It will be noted that a temporary scaffolding supported by horses is used. This illustration shows the general nature of the clamps employed for temporarily fastening ceiling strakes.

Another view of the ceiling operation, near the stern, is show in Fig. 153. This illustration shows clearly how the ceiling is clamped in place before being drift-bolted. It also indicates how the ends of the ceiling are beveled against the stern post and after-end of the keelson.

Will Retain New Yard

The American International Corp., which recently received contracts from the Emergency Fleet corporation for constructing a shipyard at Hog Island, Philadelphia, to build merchant vessels for the government, has sent out to its stockholders a request for their consent to the execution of a mortgage on the land upon which the yard is being built. The American International Corp. asserts that contrary to the previous general understanding regarding the contract with the government, Hog Island will remain its property after it has executed the contract, the mortgage to be taken by the Emergency Fleet corp. as security for the $1,700,000 the latter is advancing.

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American Ship Yard Activities

A Snappy Summary of the Leading Events of the Month in the Vessel Construction Field

Fore River Plant Being Enlarged

EXTENSIVE additions to the Fore River plant of the Bethlehem Shipbuilding Corp. have been completed, or shortly will be. The most important of these is a new machine shop for the manufacture of turbine engines. This shop, which is 130 x 250 feet and about 40 feet high, has been completed. The building is almost entirely of glass with a light framework of steel. The crane runways support two overhead cranes of 10-ton capacity, 60-foot span and lift of about 28 feet. The building is heated by steam wall radiators with a 2-pipe system. A section of the shops is partitioned off with wire mesh and is equipped as a tool room. The following machines have been installed for the manufacture of turbine engines:

One 9-foot x 13-foot 6-inch balancing pit.
One 5-foot x 5-foot x 20-foot planer.
One 5-foot x 5-foot x 14-foot planer.
One 12-foot x 16-foot laying out table.
Two 4-foot x 8-foot laying out tables.
One electric welding set.
One V-stand for rotors.
Three blading machines.
Three balancing arbors.
Three large testing tables.
Three heating outfits.
Three 10-foot vertical boring mills.
Three 8-foot vertical boring mills.
Two 7-foot vertical boring mills.
One 6-foot vertical boring mills.
Five 42-foot vertical boring mills.
Two milling machines.
Two 5-foot horizontal boring mills.
Three horizontal boring bars.
One 3½-inch horizontal boring mills.
Four 36-inch x 24-foot lathes.
Two 27-inch x 14-foot lathes.
One 25-inch x 12-foot lathes.
Two 24-inch turret lathes.
Three screw machines.

The boiler shop has been enlarged by an additional 60 x 120 feet and two more overhead cranes of 10-ton capacity have been installed. To the equipment in this building have been added 16 radial drills and two 7-spindle multiple drills.

A battle cruiser slip now under construction is nearing completion. It is 950 feet over all, constructed in 10 bays of 85-foot centers, the measurement between the inside legs of the towers being 131 feet. A 50-ton crane with span of 131 feet 6 inches is provided at a height of 120 feet and 9 inches above mean low water, and 25 feet higher are three 7½-ton cranes of the same span. In two of the towers on opposite sides of the slip are installed two electrically operated elevators of 4000-pound capacity each. The cages are 6½ x 7½ feet and run at a speed of 150 feet per minute.

The keel blocks are of concrete, made in 24-foot sections stepped down from an elevation of 33.15 feet to an elevation of 8.40 feet; the overboard ways are of the usual pile and timber construction and are pitched ½ inch per foot. In one of the towers of slip K at the north of the cruiser slip is a pump house of brick and reinforced concrete in which is installed a 1000-gallon pump with 100-foot head. This pump supplies salt water for testing purposes through 8-inch mains to lines carried on the cruiser slip structure. It is intended eventually to supply the entire plant with salt water from the pump house. The slip is equipped with air, drinking water and fire service in the usual manner from the plant and city mains.

South of the cruiser slip are four slips served by two trestles constructed of wood and steel, spaced 112 feet center to center. Mounted on each trestle is a locomotive crane of 15-ton capacity and each crane serves the two torpedo destroyers now under construction on each side of each trestle. These slips are supplied with air, drinking water, fire and testing service similar to that installed in the cruiser slip.

Two new gate houses of entirely new design have just been completed. They are of brick and wood construction. Each building has an 8-foot double door at the front and back, and eight doors, 2 feet in width, on each side, opening out. Between the doors are racks for time cards which form stalls opening into a fan-shaped space made by a partition running diagonally across the building. This partition shuts off communication with the stalls which lead to the door at the back, from the stalls on the other side of the building, which lead to the door at the front.

On each side of the doorway at the front of the building is a small office heated by steam. One is used by the gate man and one by the chief of the watch. The buildings can accommodate 3200 men and are about 32 x 34½ feet. Two additional gate houses of similar design now are under construction.

The $9,000,000 destroyer plant which the Bethlehem Steel Corp. is having built at Fore River, near Boston, is going ahead rapidly. The Aberthaw Construction Co. is erecting the plant. In addition to the main plant, work is going forward on Victory plant No. 2 at Buffalo, which is to be occupied by the Bethlehem corporation about Jan. 15. In this plant the turbines are to be made for the destroyers.

The Buffalo plant will occupy 15 acres near Tonawanda. The main building will be 750 x 200 feet, with a boiler house and administration buildings added. The construction throughout will be of steel and concrete, over 1500 tons of steel being used in the construction.

British Yards Can Compete

The following from *Fairplay*, London, reveals the English viewpoint on the comparative importance of the big new American shipyards and the old British yards.

"Without disparaging in the least the greatness of America's shipbuilding effort, I think we may safely be a little skeptical regarding the latest version of the story about how the Clyde is to be superseded in the eyes of the world as a great shipbuilding district. It is always the Clyde somehow which these stories aim at, never the northeast coast of England, although a few ships are built up there occasionally. This time we are told that on the shores of Newark bay there is to be laid out a shipbuilding plant which will be one of the largest, if not the largest, in the United States, and which "will eventually bring Newark into rivalry with the famous Clyde shipping center of Great Britain." There is to be a combination of interests on the part of the government and the Submarine Boat Corp. (a private con-

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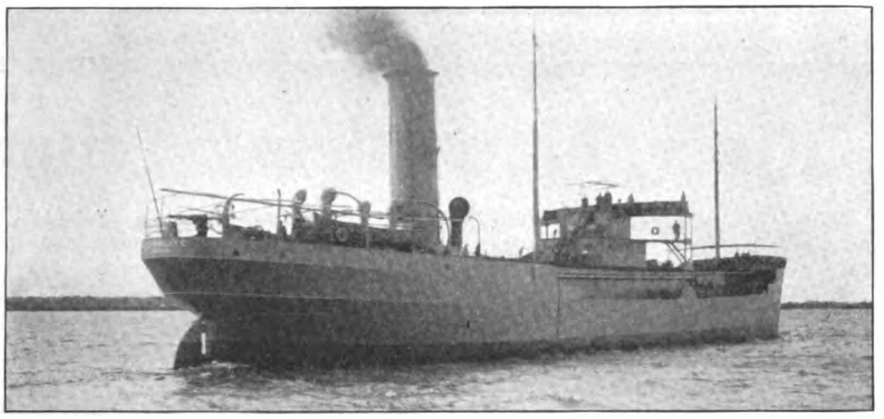
cern), and the "combination" is to control for a long period of years some 400 acres of land, on which steel ships are to be "constructed as rapidly as possible". In addition the government is to establish there the largest army and navy stores in the world, and the "combination" is to carry out dredging enterprises covering a period of two years or more, to cost from three to five million dollars—for dredging alone. "Now, I wonder if any of the people who write this sort of thing have ever seen the Clyde, or know anything about it. Do they know, for example, that in pre-war years the Clyde turned out more new tonnage than all the shipyards of the United States, that it has several single shipyards, each covering not much less than 100 acres of ground, with building berths.

Lake Built Tanker

The oil tank steamer REGINOLITE built at Sarnia, Ont., by the Collingwood Shipbuilding Co., Ltd., for the Imperial Oil Co., had her trial trip recently. She



TRIAL TRIP OF LAKE-BUILT TANKER

is designed for ocean service exclusively and is 250 feet in length, 43 feet 9 inches in breadth and 25 feet in molded depth.

The length of the vessel is divided into five cargo tanks, with a longitudinal centerline bulkhead running the full length, making 10 oil tanks in all. A fuel oil bunker is fitted immediately in front of the boiler room and a cofferdam separates this from the main cargo tanks.

The main propelling machinery consists of one set of triple expansion engines having cylinders 18, 30 and 50 inches by 36-inch stroke. Steam is supplied by two single-ended Scotch boilers, 13 feet 6 inches in diameter and 11 feet long, the steam pressure being 180 pounds, working under natural draft. The oil-pumping arrangement is of elaborate design in order to handle the cargo quickly. The trials, although carried out in stormy weather, were highly successful, the guaranteed speed being exceeded by one and one-half knots.

This is the fourth oil tank steamer built by the Collingwood Shipbuilding Co. for the same owners.

Latest News from American Shipyards

UNITED STATES STEEL CORP., interests, through the Tennessee Coal, Iron & Railroad Co., have begun the construction of a large shipyard on land recently purchased north of Mobile, Ala., George C. Crawford, president of the Tennessee company, will be president of the new concern. Ten shipways will be laid down and wharves of suitable capacity for fitting out the ships will be built. A large power plant, boiler shop, plate and angle shop, machine shop, steel metal shop, joiner shop, forge shop, storehouse and main office will be constructed. Two large villages have been laid out, one for white and the other for colored workmen. About 1600 houses will be built during the next year. The Chickasaw Shipbuilding Co. will construct the plant. The board of directors will be as follows: Judge E. H. Gary, cahirman of the United States Steel Corp.; J. A. Farrell, president of the Corporation; George G. Crawford, H. C. Ryding and L. T. Beecher. The officers will be: President, George G. Crawford; vice president, H. C. Ryding; general superintendent, J. F. Coleman; secretary-treasurer, L. T. Beecher; auditor, F. B. Winslow; traffic manager, A. W. Carey; purchasing agent, George H. Gray; superintendent of the health department, Lloyd Noland; superintendent of the roads and building department, J. M. Joy, and superintendent of the central labor bureau, J. F. Vance. A 40-inch blooming mill, a 110-inch plate mill and a 26-inch shape mill are being built at the corporation's Fairfield works for the purpose of supplying steel plates and shapes for building ships. A plate and angle shop, a forge shop, a foundry and a machine shop also will be built.

* * *

Crowell & Thurlow, Boston, have awarded to Matthews Bros., a contract to build a five-masted schooner at Belfast, Me. She will be 230 feet long, 43 feet beam and 20 feet depth of hold and will have a capacity of about 2000 tons. The keel will be laid in the Pendleton shipyard, which adjoins the Matthews Bros.' lumber plant.

* * *

One of the largest contracts ever signed by a Pacific coast shipbuilding company has been awarded to the Patterson-MacDonald Co., Seattle, by the United States Shipping Board Emergency Fleet Corp. It involves the construction of steel ships costing $24,000,000 and will require two years to complete. Seattle's shipbuilding contracts now total more than $150,000,000. The company was organized only last July. The construction of its four-way wooden shipbuilding plant was commenced in July and the first keel was laid on Aug. 11. Ten wooden vessels will be built, each having a deadweight cargo capacity of 3500 tons and a bunker capacity of 600 tons. They will be 282 feet long, 48 feet beam and 27 feet molded depth. Four ways are now being constructed for building the steel ships and later two more ways may be built. This would make a total of 10 ways. The present machine shop and foundry is being extended to a length of 440 feet. The company is also erecting a mold loft, a pattern shop, a riggers' loft, a joiner shop, a blacksmith shop, a pipe shed, a plumbing shop and a compressor plant. When these additions are completed 3000 men will be employed. The steel ships are to be of the ROBERT DOLLAR type with a deadweight capacity of 8800 tons. They will be 410 feet 5½ inches long, 54 feet beam, 29 feet 9 inches molded depth and 24 feet 2 inches draft. The ships will be equipped with 2500-horsepower reciprocating triple-expansion, single-screw engines. The first keels will be laid in about 60 days.

* * *

The Southern Shipbuilding Co., Mount Pleasant, S. C., recently organized by New York capitalists, will build steel steam freight vessels of 7500 tons capacity. The yard will be equipped for assembling the Whittelsey type of fabricated steel ship from parts manufactured in the Birmingham district.

* * *

The Sommarstrom Shipbuilding Co., a San Francisco corporation capitalized at $250,000, has been granted a permit to operate in Oregon and will establish offices at Columbia City, Oreg. The

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officers and directors of the company follow: Charles Lee Tilden, Alameda, Cal.; M. F. Sommarstrom and Edward Sommarstrom, Columbia City, Oreg.; H. R. Vail, Oakland Cal., and A. F. Lemberger, San Francisco.

* * *

Col. C. A. Pabst, John Martinolich, J. Hansen and others are building a shipbuilding plant on a site with 1000 feet frontage on Quartermaster harbor at Dockton, Wash. Six ships will be built for Norwegian interests at a cost of approximately $2,000,000.

* * *

An extensive shipbuilding plant will be built by the United States Maritime Corp. at Brunswick, Ga. The plans include the erection of six ways, two drydocks, a dock about 1800 feet long, the dredging of a basin 1500 feet long and 250 feet wide, the erection of a foundry, woodworking plant, mold loft, storage warehouse, steel fabricating mill, power house and machine shop.

* * *

Two big ship-outfitting wharves, each 850 feet long and 65 feet wide, are being built by the Skinner & Eddy Corp., Seattle. There will be two 125-foot slips which can accommodate about eight steel levathans while being equipped with their machinery and other fittings. Other additions to the plant include a third machine shop, a foundry, a shipfitters' shed, a power house and a punch shop. The extension will cost approximately $1,000,000, which will make the total expenditure on the plant over $4,000,000. Eleven ships have been launched at the plant this year and 16 launchings are now scheduled for 1918.

* * *

The Fort Mifflin Shipbuilding Co., recently incorporated with $10,000,000 capital stock, will erect a large plant on the Delaware river, near Philadelphia. Ways for 16 vessels will be built, also boiler and blacksmith shops, woodworking plants, lumber sheds, copper, paint and joiner shops, a brass and iron foundry, an outfitting dock and reserve basin. Arthur Masters, Montclair, N. J., is president of the company; William A. Crump, Newport News, Va., and Henry D. Bacon are vice presidents.

* * *

The Oscar Daniels Co. has leased the plant of the Tampa Shipbuilding & Engineering Co., Tampa, Fla., and will commence the construction of 10 9500-ton steel ships for the Emergency Fleet corporation.

* * *

The new Erickson Engineering Co., Seattle, is establishing a large steel shipbuilding plant. This company recently received a contract for 10 9500-ton steel ships from the Emergency Fleet corporation.

* * *

The Kelley-Spear Co. has laid the keel for the first cargo carrier for the government to be built at Bath, Me. The vessel will be 281.6 feet long, 46 feet beam and 26 feet molded depth, with a deadweight capacity of 3500 tons. She will be a single-deck type, schooner rigged, four hatches and will have triple expansion engines.

* * *

The four-masted schooner AGNES E. WILCOX will be launched early in January at the plant of the Stockton Yards, Inc., Stockton Springs, Me. This will be the first launching to take place at Stockton in 40 years. The vessel is 172 feet keel, 37 feet 6 inches beam and 14 feet 6 inches depth of hold. Before the WILCOX is launched another vessel will be started on the same molds, to be launched next June.

* * *

A million-dollar shipbuilding corporation will be organized by the St. Louis chamber of commerce. This action follows a suggestion made by Secretary of Commerce Redfield during a visit in St. Louis and will supplement efforts of the government to conserve the country's resources by utilizing inland waterways for transportation purposes.

* * *

The Williams Shipbuilding Co., Tampa, Fla., has broken ground for the erection of a shipbuilding plant, which will include four ways.

* * *

The William Cramp & Sons Ship & Engine Building Co., Philadelphia, has purchased the De La Vergne Machine Co. in New York City for $1,500,000. The Cramp company proposes to build engines at this plant. The plant, which covers about 5½ acres, at present employs about 600 men and no reduction in the working force will be made.

* * *

The shipbuilding plant of Thomas M. Fairclough & Co., Boston, has been purchased by the American Shipping & Export Co., 112 Water street, New York, which will build a fleet for its own use.

* * *

A contract has been received by the Daniels Construction Co., New York City, from the United States shipping board covering the construction of 12 all-steel ships of 9500 tons deadweight capacity. The Daniels company will build its shipyard in Brunswick, Ga.

* * *

During the first half of November seven requisitioned vessels were launched from American yards, including the following: A 4000-ton vessel at a Detroit yard; a 5000-ton vessel at Baltimore; a 3100-ton vessel at Ashtabula, O., a 2930-ton vessel at Toledo, a 4100-ton vessel at Detroit, a 10,475-ton vessel at San Francisco and a 5500-ton vessel at Montreal.

* * *

It is reported the Southern Pacific Co. contemplates the erection of a shipbuilding plant at Alameda, Cal. Plans have been made for the dredging of the channel along the seawall to give dockage space to approximately 80 acres of the company's property.

* * *

The Pacific Coast Shipbuilding Co. has started the erection of a $1,000,000 shipbuilding plant at Bay Point on Suisun bay in Contra Costa county, Cal. Equipment for the plant already has been purchased. The company has secured government contracts to build $16,000,000 worth of steel cargo ships. The boats will be of the 2800-horsepower turbine type. The site has a water frontage of 2800 feet. The plant will include the most modern type of ways, building slips, docks, foundry, machine shops and administration building. The company is capitalized at $5,000,000. The plant will employ 2500 men and a townsite to be known as Mill City is to be laid out by the company.

* * *

The Hampton Roads Dry Dock Corp. has received a contract from the government to build four ships of 7300 tons capacity each, involving a sum approximating $5,000,000.

* * *

During November two freighters were launched from Baltimore yards for the Cunard Steamship Co. The WAR DRAGON, which is 377 feet long, 52 feet beam and 29.6 molded depth, was launched by the Bethlehem Shipbuilding Co. and the WAR WHALE, which is 340 feet long, 49 feet beam and 28.6 molded depth, was launched by the Baltimore Dry Docks Shipbuilding Co.

* * *

The Terry Shipbuilding Co., Port Wentworth terminal, Savannah, Ga., is progressing rapidly on the construction of steel and wood cargo vessels being built for the government. Although construction was started only last July, all the buildings have been completed and most of the 12 ways have been built. Twenty vessels, valued at $500,000 each, are to be built and keels for several have been laid. The first boat will probably be launched next March.

* * *

The International Shipbuilding Corp. has started the erection of an extensive plant at Nordin, on the Miramichi river, N. B., Can., for the construction of wooden ships.

* * *

The Elliott Bay Shipbuilding Co., Seattle, has received contracts for several full powered, ocean-going wooden motor ships for Atlantic coast interests, which will cost $1,500,000. The company was recently incorporated with $250,000 capital stock and is a reorganization of the Elliott Bay Yacht & Engine Co.

* * *

The Construction & Dry Dock Corp. has been incorporated with $500,000 capital stock and will build and operate a shipyard at Portsmouth, Me.

To Train Officers

Henry Howard, director of recruiting for the United States shipping board, with national headquarters at Boston, has announced the appointment of Henry G. Vaughan, Boston, as chief of Section 1, free government navigation and marine engineering schools. He succeeds G. M. Congdon, a Providence steel merchant, who is called to the ordnance department at Washington by the war department. Mr. Vaughan will have supervision of the free government schools from Eastport, Me., to the Connecticut river. These schools are training officers for the new American merchant marine. Mr. Vaughan is another of the prominent business men who are giving their time to the shipping board recruiting service at the nominal salary of $5 a month.

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Late Decisions in Maritime Law

Legal Tips For Ship Owners and Officers

Specially Compiled for The Marine Review

By Harry Bowne Skillman

Attorney at Law

A WIRELESS operator, it appeared in the case of BUENA VENTURA, 243 Federal Reporter 797, came on board the vessel in pursuance of a contract between her owners and the Marconi Wireless Telegraph Co. of America, under which contract he was required to sign the ship's articles, was classed as an officer, and messed with them; assistance, if any, of the wireless apparatus operated by him was to bring to the Marconi company "a fair and reasonable proportion of salvage moneys" that might be awarded to the shipowners; and, finally, a part of his duty was to instruct an officer of the ship in the art of sending messages by wireless apparatus. The operator did sign the articles, but purely as a formality; his stated rate of wages was 25 cents per month, which was never collected; he received board and lodging from the ship, and a regular stipend from the Marconi company; and, by an arrangement between himself and the captain, he operated the launch while in port, receiving therefor $15 a month. The court held that the operator, who was ill of iritis, fell ill "in the service of the ship", and is therefore entitled to maintenance and cure if he is to be regarded as a seaman or a member of the crew. The court then held the operator to be a seaman, saying, "The word 'seaman' undoubtedly once meant a person who could 'hand, reef and steer', a mariner in the true sense of the word. But as the necessities of ships increased, so the word 'seaman' enlarged its meaning." The operator, the court further held, was also a member of the crew, which is defined to be those persons who are on board the vessel aiding in her navigation, without reference to the nature of the arrangement under which they are on board.

* * *

The rule of law ordinarily is that the charterer of the vessel, even in the absence of an express agreement to unload with reasonable dispatch, impliedly agrees that the freight shall be unloaded without unreasonable delay and in conformity to the custom and usage of the port. "But this is not a hard and fast rule," it was decided in the case of Acme Transit Co. v. 133,000 Bushels of Wheat, 243 Federal Reporter 970, "and, when it appears that the charter party or bill of lading or contract of affreightment makes no specific allowance for damage or for any number of lay days for unloading, nor specifies a definite time to discharge, due regard must be given to the particular circumstances contributing to the delay and legitimately bearing thereon."

* * *

In the case of GULFPORT, 243 Federal Reporter 676, the meaning of the word "shore", as used in the law of salvage, was up for decision. Counsel cited numerous authorities to show that the word meant the space between high and low tide, and contended that, as the authorities speak of goods cast upon the shore being liable to salvage, if the thing be cast further upon the land than the ordinary high tide reaches, this is not on the shore, and therefore is not subject to salvage. The court, before deciding the point, said: "Admiralty courts, while not striving to increase their jurisdiction, have never been given to technical or narrow construction." It was then held that for salvage purposes, the word "shore" should be liberally defined, and, as so defined, should be that portion of the land lying between low-water mark and the point at which the water, whether by the natural flow of the tide, or by stress of wind and waves, reaches.

* * *

A ship is "deficient" in men within the meaning of a contract providing that hire should be suspended for the time lost "by reason of a deficiency of men", it was decided in the case of the CANADIA, 241 *Federal Reporter* 233, where some of the crew drank to excess and became so unruly that help from shore had to be called in, delaying the voyage two days.

* * *

A wireless plant, aboard a vessel, was held in the case of MANCHIONEAL, 243 Federal Reporter 801, not to be "cargo", "freight", or "baggage", as those words have long been understood, the court saying that "The relation of wireless apparatus to the vessel upon which it is installed is perhaps not easy to define in terms of historic law, because the relation itself is so recent." The court further said, "The shipowner is not an insurer, but if, at termination of contract or employment, he is unable to return the apparatus through any fault of his own, both he and his ship are liable for affirmatively proved negligence."

* * *

"The duty of the ship to the stevedore," it was decided in Conley v. Consolidation Coastwise Co., 242 Federal Reporter 591, "is to exercise the care of a reasonably prudent man in providing a safe place for him to work; in keeping the premises, where he has a right to be, secure against danger to life and limb. This duty arises out of the necessity of the stevedore's services to the ship. The deck of the ship is not a highway; but it must be made reasonably safe for workmen who are invited to render services to the ship, and who are in the exercise of ordinary prudence."

* * *

"It is the law of the sea that recovery may be had for wages, maintenance, and expenses of cure of a seaman injured on a vessel in the service of which he is engaged. It is the uniform rule of admiralty that a seaman, injured in the service of a ship, is entitled to maintenance and cure, and wages at least to the end of the voyage, irrespective of the question of negligence." —Sorensen v. Alaska Steamship Co., 243 Federal Reporter 280.

* * *

"The following elements are to be considered in determining the amount of a salvage award: (1) The labor of the salvor in rendering the salve service. (2) The promptitude, persistence, skill and energy displayed in saving the property. (3) The value of the property employed by the salvors in rendering the service, and the danger to which it was exposed. (4) The risk incurred by the salvors. (5) The degree of danger from which the vessel and cargo were rescued, and the value of the property." —LIVIETTA, 242 Federal Reporter 195.

The same case also held that where, when a salving vessel approached a vessel which was on fire at sea, no one of the latter vessel's officers or crew were aboard her, but were in life-boats alongside, and were there doubtless for the purpose of again going aboard, if it appeared feasible and safe, and of securing the services of other vessels to salve her, it cannot be said that the vessel had been abandoned, and was a derelict, so as to affect the amount of the salvage award.

* * *

The performance of the double function by the captain of a tug in charge of towing and docking operations and his presence as pilot for the steamer, in order that there might be a compliance with the statutes requiring the presence of a pilot upon the bridge of the steamer while navigating inland waters, did not render the steamer liable for those operations which were exclusively the actions of the towing agent, it was held in the case of STELLA, 243 Federal Reporter 216.

* * *

Laws of Florida, Chapter 6521, defining the persons, firms, and corporations engaged in hazardous occupations, and among them "boating, when the boat is propelled by steam, gas, or electricity," is not violative of the fourteenth amendment of the constitution of the United States, as being an unreasonable classification, in that sailing vessels are not included.—MERRIMAC, 242 Federal Reporter 572.

* * *

The case of HISPANIA, 242 Federal Reporter 265, holds that the temporary jamming of steering gear, which was unavoidable, and was speedily corrected, and was not caused by any defect, nor by any negligence of the officers or crew of the vessel, did not constitute unseaworthiness, so as to render the vessel liable for damage to the cargo.

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Anyox—A New Wooden Ore Carrier

Details of Interesting Steamer Recently Completed at Yards of Winslow Marine Railway and Shipbuilding Co.

By Robert C. Hill

COMBINING all the necessary qualifications of a staunch ore carrier and a powerful towing vessel, the wooden American steamer ANYOX, now approaching completion at the plant of the Winslow Marine Railway & Shipbuilding Co., Winslow, Wash., is in a class by herself and a type that is of unusual interest.

The ANYOX, launched last August, and made ready for service in November, is the property of the Coastwise Steamship & Barge Co., of which James Griffiths & Sons, Seattle, are the managing agents. The new steamer is the idea of Capt. James Griffiths, president of the several companies in which he is interested. Inasmuch as he is thoroughly familiar with the needs of the coasting trade between British Columbia and Puget Sound, he has combined in the ANYOX all the requirements that will distinguish her as an exceptional vessel, peculiarly adapted to her trade.

Named After Mining District

The new steamer is named after Anyox, B. C., the center of a vast mining district where a large smelting works is located. The exports from Anyox form a heavy tonnage annually and the large fleet of steamers, tugs and barges operated by the Coastwise Steamship & Barge Co., brings the output of mines and smelter to Puget Sound, returning with general cargoes.

Sufficient staunchness to successfully carry heavy bulk cargoes of ore and power for towing heavy ore-laden barges are the requisite requirements in this trade. In the ANYOX owners and builders believe they have every essential qualification. While the trade route between Puget Sound and northern British Columbia is sheltered from the wide sweep of the Pacific the greater part of the distance, there are exposed points at which heavy seas are frequently encountered. In the ANYOX seaworthiness has been provided and, if necessary, the new vessel can be dispatched to Nome, Alaska, or Panama, being not only of sufficient strength for long off-shore voyages, but also having the equally necessary steaming radius. The vessel is of sufficient size to make her a commercially paying proposition, but not too large to handle tows in the narrow waters of the northern route.

The best selected Douglas fir and other materials have been used in the ANYOX and in every respect her construction is up to standard not only as to material, but as to workmanship.

In the ANYOX, frames are spaced on 30-inch centers and 1⅛-inch drift bolts fasten them to the keel. As an illustration of the strength of the hull, it is interesting to note that the spaces between the frames and in the wake of the machinery, sea valves, etc., are filled in solid with timbers molded the same depth as frames.

Strengthening Bulkheads

Adding greatly to the strength, two continuous longitudinal bulkheads are provided. They extend from the floor of the hold to the deck on either side in line with the fore-and-aft hatch combings. Solid timbers compose the portions of these bulkheads in the cargo spaces, while on either side of boiler and machinery space, fabricated steel is used. Openings through the steel bulkheads give access to the wings where some of the auxiliary machinery is located. The side combings for the hatches run continuously from bow to stern and are used as side sills upon which the main deck house rests.

The general dimensions of the ANYOX are: Length over all, 205 feet

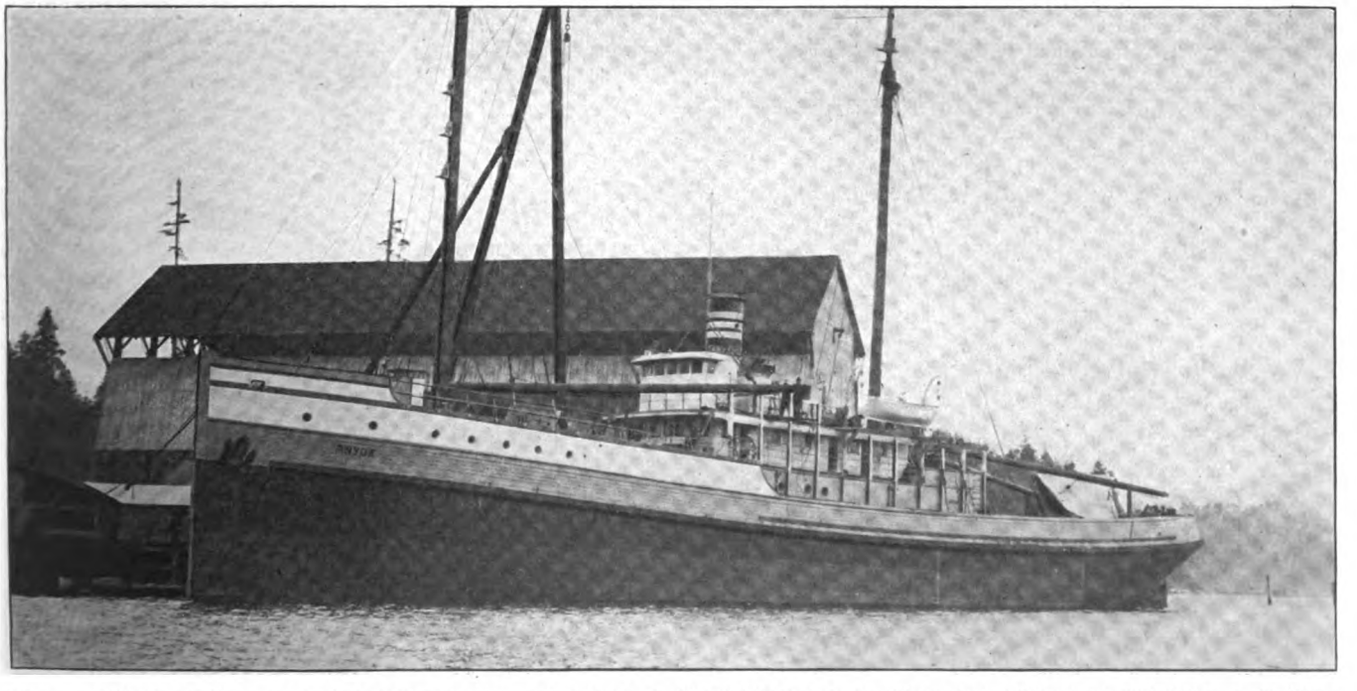

FIG. 1—ANYOX, BUILT BY WINSLOW MARINE RAILWAY & SHIPBUILDING CO. FOR COASTWISE STEAMSHIP & BARGE CO., SEATTLE, READY FOR HER TRIAL TRIP

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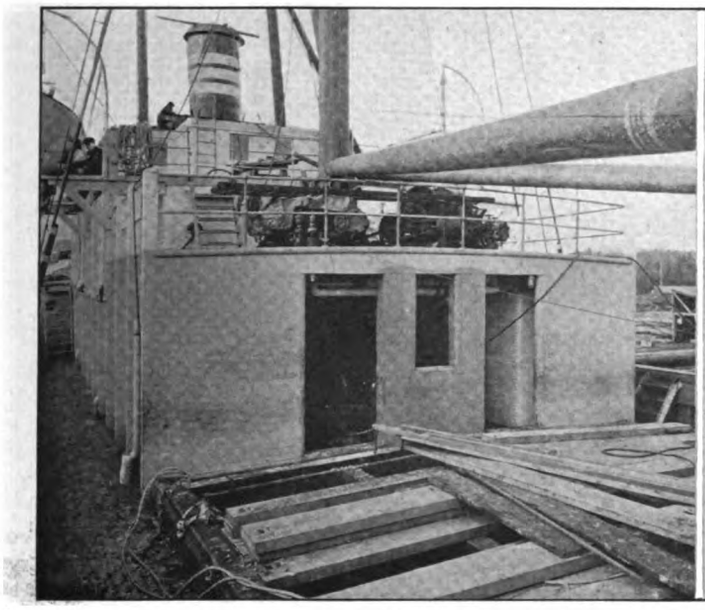

FIG. 2—DECK VIEW OF ANYOX SHOWING STURDY HATCH CONSTRUCTION

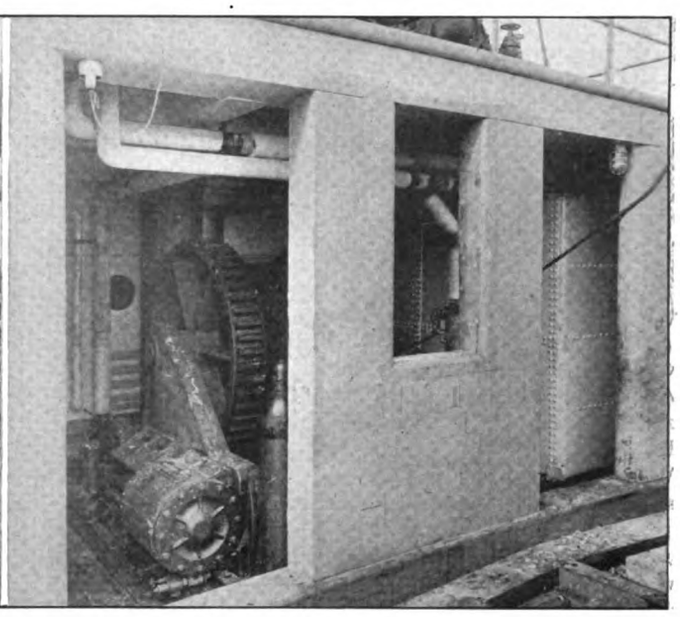

FIG. 3—ANYOX IS WELL EQUIPPED WITH AUXILIARIES

6 inches; length from after end of stem to fore side of stern post, 184 feet 8 inches; beam molded, 38 feet 8½ inches; beam outside of planking, 39 feet 8½ inches; beam inside of ceiling, 34 feet; depth of hold, 19 feet 9 inches; depth molded, 23 feet 4 inches; deadweight cargo capacity, 1280 tons.

General Plan of Vessel

The vessel is single-decked with house and machinery placed amidship. A raised deck forward provides crew's quarters underneath. The house is on the maindeck and runs to the lines of the fore-and-aft hatch combings, covering the machinery space. Pilot house, texas for captain's quarters, and bridges are located atop the forward part of the house.

There are two masts, each equipped with booms for handling cargo from each of the two hatches. These hatches are forward and aft of the machinery space on the main deck. Each hold has a specially designed ore bin of exceptionally strong construction. Grab buckets, operated by tackle, will be used for discharging ore.

The ANYOX is an oil-burner and is provided with tankage for steaming 2300 miles. The fuel-oil tanks are located in the spare space in the wings as well as fore and aft where also are the water tanks. The steaming radius is sufficient for any trade in which the ANYOX may ply. The Coen system of oil-burners is in use. The two boilers, of the Heine water-tube type, are the product of the Union Iron Works, San Francisco.

Powerful Engine Employed

Exceptional power for a vessel of her size is furnished by a triple-expansion engine of approximately 1100 indicated horsepower. It runs 120 revolutions per minute, with a working pressure of 180 pounds per square inch. The cylinders are 17 x 27 x 44 inches, with 30-inch stroke. The propeller is of the iron hub type with bronze blades. Steam steering gear of the Williamson type, as well as hand gear, are included in

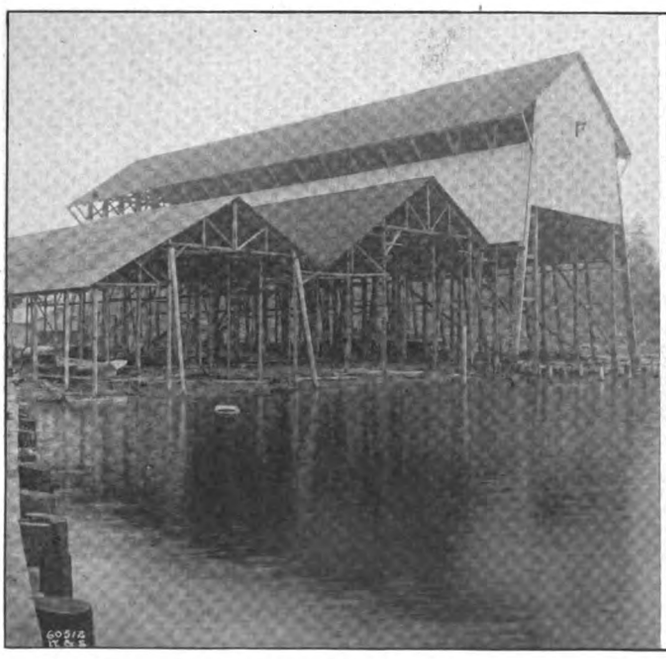

FIG. 4—SHIPBUILDING SHEDS AT WINSLOW PLANT

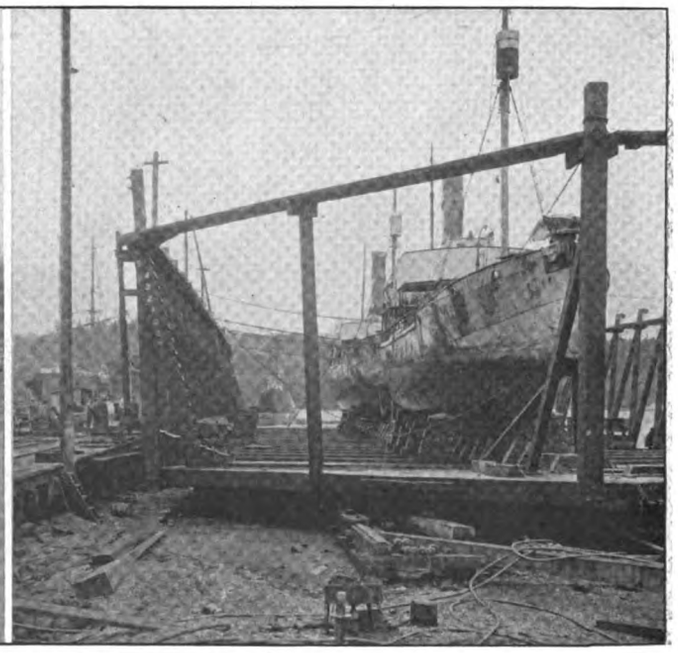

FIG. 5—MARINE RAILWAY AT WINSLOW SHIPYARD

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FIG. 6—LAUNCHING THE ANYOX

the equipment. There are two friction drum cargo winches for each hatch, the two foward being on the forecastle deck and the two aft on top of the main deck house.

On the main deck at the after end of the main deck house is a towing machine, manufactured by the American Engineering Co., Philadelphia. It is equipped with guide rollers and also has a heavy roller fitted out at the stern bulwarks to lead the towing hawser. Every necessary attachment is provided for heavy towing and deep sea operations.

The ANYOX will be unique among Pacific vessels in being equipped with an electric range in the galley. This range is of the latest and most approved design furnished by the General Electric Co. Electric lights throughout are installed, making the vessel thoroughly modern and convenient for officers and crew. A searchlight of unusual power is installed on the top of the pilot house. Wireless, of the Kilbourne & Clarke type, adds to the completeness of the vessel's equipment.

Makes 11 Knots on Trial

Following an informal trial on Nov. 24, the ANYOX came to Seattle to load for her maiden voyage to Anyox, B. C., and way ports. The ANYOX was not put through the exhaustive trials, which are customary, as the owners did not consider it necessary and for the further reason that the vessel was needed as soon as completed. On the short trial the new steamer behaved splendidly and after a brief spin satisfied her owners that she was perfectly fit for the hard work ahead. On her trial she easily made 11 knots and in every particular came up to expectations. After loading at Seattle two days, she proceeded to British Columbia on her initial voyage.

Marine experts, familiar with the ANYOX, declare her one of the best-built craft on the west coast and a credit to the yard where she was constructed. She has been built to the requirements of Bureau Veritas and in every respect is adapted for ore carrying and towing. Every facility is furnished for the rapid and economical handling of cargo. There will be 27 in the crew. While the vessel embodies the general ideas of Capt. James Griffiths, the plans were drawn by Harvey C. Nugent, naval architect for the Winslow Marine Railway & Shipbuilding Co. The construction work was under the supervision of C. C. Lacey, superintendent of the Winslow plant, formerly marine superintendent for the Great Northern Steamship Co.

The plant at Winslow has been in existence for many years, and a large fleet of commercial and government wooden vessels has been launched from this yard, until July 1, 1916, known as Hall Bros. Marine Railway & Shipbuilding Co. On the date mentioned, Capt. Griffiths acquired ownership and since then, with numerous improvements, the plant has been successfully operating under the name of Winslow Marine Railway & Shipbuilding Co. Capt. Griffiths is president of the shipbuilding company, and Stanley A. Griffiths, secretary.

Shipyard is Well Situated

The site of the Winslow shipyard is considered ideal. It is on Bainbridge Island, across Elliott Bay from Seattle, eight miles distant. Eagle Harbor, where Winslow lies, is completely landlocked and thoroughly sheltered from the weather. The ship plant has a site 91 acres in extent, of which about 10 acres are occupied by the plant. The yards were established 16 years ago by Hall Brothers, famous builders, who first began building at Port Ludlow in 1874, later moving to Port Blakely and again to Eagle Harbor. Hall Brothers established an enviable reputation as shipbuilders of the first class, many of the best schooners on the Pacific coast being products of their yards. Needless to say, it is the aim of the Winslow Marine Railway & Shipbuilding Co. to maintain the reputation of

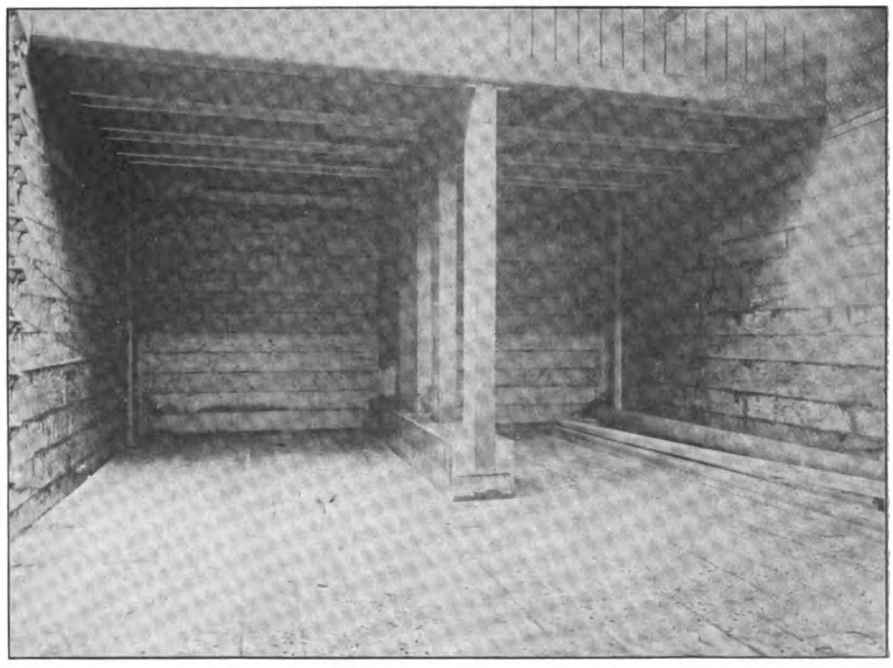

FIG. 7—HOLD CONSTRUCTION SHOWING SUBSTANTIAL ORE BINS

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its predecessor. In the ANYOX it is believed that the high standards of the old company have been more than realized.

The equipment of the plant consists of a 325-foot steel cradle type marine railway, capable of handling 4000 tons, a 300-foot building shed with ways underneath, machine shop, boiler shop, blacksmith shop and saw mill. The yard has a half-mile frontage on deep water, where sailing vessels anchor with safety while awaiting repairs. This yard has for years been a rendezvous for schooners and other wooden sailing vessels requiring docking, general repairs and particularly new masts. Since the present owners acquired the plant, it has been continuously busy with both repair and construction work. One of its best features is its accessibility to the raw material, large trees for ship masts, keels, etc., being within easy distance.

The improvements at this yard since the Winslow company purchased the plant include the building shed, a latest style tilting band saw and a specially designed Stetson & Ross beveling header and beveling planer.

Following the launching of the ANYOX, the yard began work on a 100-foot oil scow, now almost completed. Two other scows of the same type, for the account of James Griffiths & Sons, are to follow. These will be used for freighting fuel oil between ports on Puget Sound. In addition, the marine railway has been in continual demand in hauling out vessels for hull repairs.

Lake Wrecker Goes to Foreign Waters

THE Great Lakes wrecking steamer FAVORITE, said to be the most completely equipped craft of its kind, has been taken over by the United States navy. Her master, Capt. Alex. Cunning, is under orders to take his vessel to Montreal where she will be turned over to the government. The FAVORITE will be sent immediately to foreign waters for work on wrecked vessels that can be saved by a completely equipped wrecker of the FAVORITE type. The FAVORITE was built at Buffalo, costing approximately $250,000. Today she is worth over twice that sum. Her principal dimensions are: Length over all, 195 feet; length of keel, 180 feet; beam, 43 feet; draft, 19 feet 6 inches; gross tonnage, 1223. She is equipped with two Scotch marine boilers 15 feet diameter and 11 feet 6 inches long. Each boiler has three furnaces and is allowed 180 pounds working pressure. Her engine is of the latest improved triple-expansion type with cylinders 22, 36 and 60 inches bore x 30-inch stroke. The FAVORITE is shown under way in Fig. 1.

The shop equipment of this vessel is complete in every respect, even to the smallest detail. The blacksmith shop is illustrated in Fig. 2 and contains the customary outfit of forges, anvils, small tools, stock racks, etc. The power shear shown in the foreground is capable of punching and shearing steel plates up to one inch in thickness.

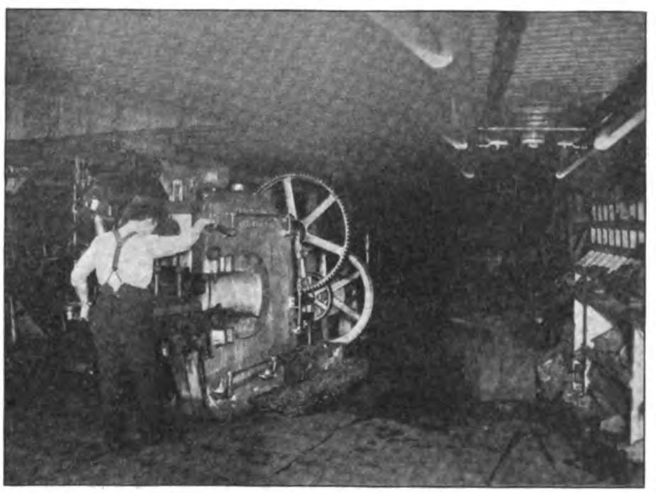

FIG. 2—THE BLACKSMITH SHOP

The machine shop is also complete. The equipment consists of an engine lathe, shaper, drill press, pipe and bolt cutters, a grinding wheel stand, the usual amount of small tools, such as drills, taps, reamers, files, etc., and commodious stock lockers. The wrecking equipment of the FAVORITE includes the following appurtenances: A 'frame derrick forward, with powerful engine operating a 3-ton grab bucket; patent sectional collision mat to cover fracture 20 x 30 feet; derrick with steam hoist aft for handling equipment; special towing machine with 1800 feet of 2-inch steel towing cable; stationary air compressor which will furnish 500 feet of free air per minute at 100 pounds pressure; complete equipment of pneumatic tools and ham-

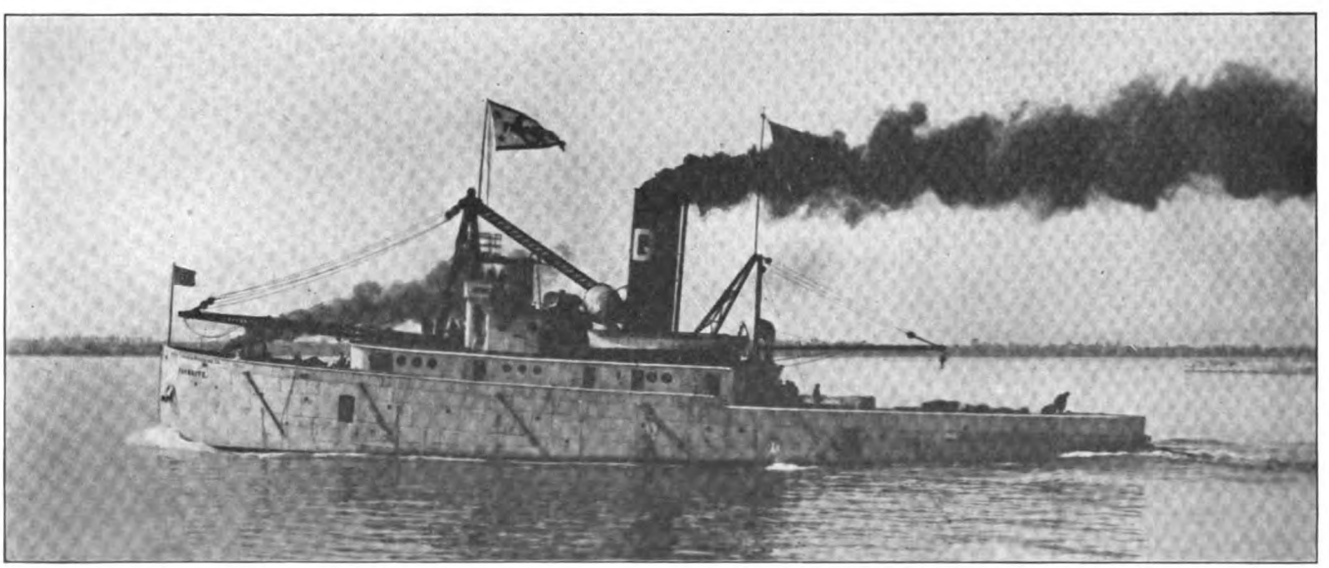

FIG. 1—THE GREAT LAKES WRECKER FAVORITE ANSWERING AN EMERGENCY CALL

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mers; three portable air compressors; five large wrecking pumps and portable boilers; thirty 100-ton hydraulic jacks and steel hutchicks; power saw mill for getting out lumber and blocking; gasoline power launch; full equipment of submarine and portable electric lights; powerful search light; full outfit of supplies and ship chandler's stores and other equipment for wrecking purposes. She is equipped with wireless apparatus.

The owners of the FAVORITE received many offers from foreign governments to purchase the vessel outright, one amounting to $375,000. All offers were turned down, however, the boat being reserved for the United States government.

It is fortunate that the FAVORITE leaves the lakes at the close of navigation, otherwise her loss would be more keenly felt than it is under present conditions, as her services are in great demand. The FAVORITE is owned by the Great Lakes Towing Co., Cleveland, which will replace her as soon as possible.

Architects' Meeting

(*Continued from page 3*)

cured through autocratic control.

The following papers also were presented: "Progress of Marine Engineering and the Education of the Marine Engineer", by Robert Haig, surveyor, Lloyd's Register of Shipping, New York; "Wind and Fouling Resistance on the NEPTUNE", by W. W. Smith, engineer, Westinghouse Machine Co., Pittsburgh; "Recent Developments in Tank Steamer Construction", by Robert W. Morrell, hull superintendent, foreign shipping department, Standard Oil Co., New York; "Application of Electricity to Various Auxiliaries on Shipboard", by H. L. Hibbard, engineer, Cutler-Hammer Mfg. Co., New York; "Gyro Ship Stabilizers in Service", by Elmer A. Sperry, New York; and "Devices for Comparing the Rotation of Shafts", by Dr. K. Suyehiro.

The annual address of the president, Stevenson Taylor, president, American Bureau of Shipping, New York, is presented in full elsewhere in this issue. It deals with the progress of merchant shipbuilding throughout the world.

The annual banquet at the Waldorf-Astoria, Friday evening, Nov. 16, was the largest in the history of the society. Over 600 covers were laid. Josephus Daniels, secretary of the navy, was the guest of honor. The secretary paid a glowing tribute to the shipbuilders of the nation who, to a man, he said, are backing the government to the very limit.

Since the completion of all the New York barge canal locks, exact measurements have been made at each lock in order to determine the dimensions of these structures as they stand now. It has been found that the maximum rectangular parallelogram which can be passed through all the locks, measures 300 feet in length by 44.44 feet in width. The upper end of each lock chamber is bounded by a wall which has a concaved lower face, these faces being circular arcs in some cases and made up of several chords in other cases. This concaved face adds 10 feet to the length at the center of the lock chamber.

From these figures it will be seen that a boat or a fleet of boats not exceeding the size of the parallelogram may pass all the locks. To take advantage of the curve at the upper end, the prow and stern of a boat must conform to certain lines or it will not be able to make the passage of the canal.

Harris is New Manager

Rear Admiral Frederick R. Harris, who was chief of the bureau of yards and docks in the navy department, has succeeded Rear Admiral Washington L. Capps as general manager of the Emergency Fleet corporation. Admiral Capps recently resigned because of ill health. Admiral Harris is the third general manager of the corporation, the first, Maj. Gen. George W. Goethals, having been replaced by Admiral Capps as a result of the famous Goethals-Denman row. It has been reported that there had been friction between Admiral Capps and Chairman Hurley, of the shipping board, but there is no foundation for such rumors.

Admiral Harris will not have as broad powers as General Goethals had or as broad as those exercised by Admiral Capps until recently. Charles Piez, president of the Link Belt Co., Chicago, who has been made vice president of the Fleet corporation, has virtually taken up these duties and Admiral Harris will co-operate with him, using his naval construction experience in the problems confronting the Fleet corporation.

In the last few months the shipping board and the Fleet corporation have expanded to a size more commensurate with the work mapped out for them. The shipping board, reorganized after the Goethals-Denman fiasco, is now constituted as follows: E. N. Hurley, chairman; Raymond B. Stevens, vice chairman; John A. Donald, Bainbridge Colby and Charles R. Page, commissioners; Admiral Harris and Capt. E. T. Bertholf, all of whom constitute the board of directors. Messrs. Hurley, Stevens, Donald, Colby and Page are the commissioners of the shipping board. Its secretary is Lester Sisler. Edward F. Carey is director of operations and Edward B. Burling is chief counsel.

The officers of the Fleet corporation are: Edward N. Hurley, president; John A. Donald, vice president; Charles Piez, vice president; Raymond B. Stevens, treasurer; Lester Sisler, secretary; Rear Admiral Harris, general manager; George E. Oller, executive secretary; Laurence Leonard, chief clerk; Rear Admiral F. T. Bowles, manager of construction division; Daniel H. Cox, assistant to manager of construction division; Theodore E. Ferris, naval architect and construction engineer; Horace H. Thayer Jr., assistant to the naval architect; Meyer Bloomfield, head of industrial service department; E. C. MacNary, expert in industrial training; Rear Admiral Adam H. H. Rousseau, manager shipyard plants division; Reuben E. Bakenhus, assistant to manager shipyard plant division; C. T. Bissell, advisory engineer of fire protection; George S. Radford, manager contract division; Frank A. Browne, general purchasing officer; A. L. Bell, assistant to general purchasing officer; John P. Bourke, assistant to purchasing officer; W. R. McCann, assistant to purchasing officer; Grover R. Jasper, purchasing assistant; Thomas D. Adams, purchasing assistant; E. A. Rebbeke, supervising inspector; Joseph Birnie, chief clerk, purchasing division; H. M. Lewis, priority department, purchasing division; D. H. Bender, general auditor; Gordon Wilson, assistant general auditor; H. M. Luckett, disbursing officer; John Barton Payne, general counsel; and D. L. Ewing, director of traffic.

Henry Ford later is to become associated with the executives of the shipbuilding project as a standardization expert. Other manufacturers and shipbuilding experts are expected to join the forces from time to time.

Searching for Lost Sailor

Miss Grace H. Fernea has enlisted the assistance of THE MARINE REVIEW in locating her father, John Fernea, who when last heard of a was a cook on a government dredge. She has not heard from him for two years. In 1915 he was cook on a government dredge which had been built at Menominee, Wis. The daughter is anxious to have anyone familiar with his present whereabouts, communicate with her through the medium of THE MARINE REVIEW.

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On the Coasts, Lakes and Rivers

What's Doing and Who's Doing It

More Lake Boats Are Commandeered

By M. L. Hadden

THE steel steamers L. W. ROBINSON, A. D. MACTIER, F. P. JONES and ADRIAN ISELIN have been taken over by the shipping board and ordered to the coast. The steamers, which were owned by the George Hall Coal & Transportation Co., Ogdensburg, N. Y., are Welland canal size.

* * *

The Great Lakes Transit Corp. and the Northwestern Steamship Co. have agreed to extend their lake service, the former until Dec. 12 and the latter as long as weather conditions will permit, by arrangement with the United States food administration. This commission has secured the use of a new ship just launched at Duluth to carry a cargo of 1000 tons of flour from Duluth to New York.

* * *

Michael Connelly, of the firm of Connelly Bros., ship chandlers, Buffalo, died Nov. 10 at the age of 71. Mr. Connelly had been in the ship chandlery business for 50 years.

* * *

Frank Wasserthal, a German alien, has been arrested in connection with the recent strike of Duluth stevedores. Officials of the department of justice, who caused his arrest, stated that he had instigated the strike and would be sent to a detention camp for alien enemies. In this connection, Herman Voight, enemy alien, has been taken off the steamer YUMA pending an investigation, Detroit federal officials holding that German aliens are barred from employment on lake vessels.

* * *

Captain Gerald Stufflebeam has resigned as master of the steamer ILLINOIS of the Northern Michigan Transportation Co., and will enter the government service as an inspector of vessels at lake shipyards.

* * *

The steamer E. C. POPE is being repaired at the yard of the Superior Shipbuilding Co., Superior, Wis.

* * *

The steamer SULTANA will be placed in dry dock owing to an accident which occurred to her bottom recently. She was on her way to an elevator at Buffalo when she struck some obstruction which punched a hole below the water line. The cargo of grain was saved by quick work with the pumps.

* * *

The steamer MAUD was damaged severely by fire at St. Clair, Mich. She was built in 1899.

* * *

The steamer J. C. FORD will be overhauled this winter at a Detroit shipyard under supervision of Captain William I. Crosby, of the Michigan Sulphite Fiber Co. The company will purchase another steamer larger than the FORD for use next season in transporting its shipments of pulp wood from Lake Superior.

* * *

The steamer HENRY HOUGHTON, of the Bay City Sand & Gravel Co., Bay City, Mich., will be sold at auction to satisfy unpaid wage claims of the crew.

* * *

The steamer GOUDREAU, which went ashore at Lyles Reef, Lake Huron, is being raised by the tugs MARTINIQUE and FOREST. The GOUDREAU is badly disabled and will be towed to Cleveland.

* * *

The steamer WESTERN STAR, which was on the rocks in Georgian bay for two years, has been sold to the Valley Camp Steamship Co. for $385,000. She will be repaired at the yard of the Toledo Shipbuilding Co. at a cost of about $200,000.

* * *

The tonnage of the Lake Carriers' association will be pooled next season and the boats will be operated by a committee. The management of the ships will remain as at present, but the boats will be handled with the idea of getting the best possible service out of them during the duration of the war.

* * *

The steel tug W. B. SANDERS, owned by the Kelley Island Lime & Transport Co., has been taken over by the shipping board for coast service. She will be fitted for salt water service at once. She was formerly used to tow stone barges between Cleveland and the islands.

* * *

Edward Gaskin, Buffalo, H. N. Harriman, Cleveland, and J. H. Smith, Baltimore, have been appointed members of a board of appraisers to fix the prices of lake ships commandeered by the government for salt water service.

* * *

The shipping board has taken over the tugs H. D. GOULDER, of the Great Lakes Towing Co. fleet, and the EDNA G., operated at Two Harbors by the Duluth & Iron Range railroad. The boats will be fitted for salt water immediately.

* * *

The steamer JAMES S. DUNHAM, which was sunk after a collision with the steamer ROBERT FULTON, near Grassy island in the Detroit river, has been raised and will be repaired at the Ecorse yard.

* * *

The steamer GEORGE F. BAKER, of the Pittsburgh Steamship Co., which sank near the Soo after striking a boulder off Vidal shoals, is now in drydock at South Chicago, where she will be for several weeks undergoing repairs. Thirty-six of her plates were damaged, of which 14 will be replaced.

* * *

The tug GEORGE PANKRANTZ has been rebuilt by the Lake Erie Drydock & Mill Co., Sandusky, and has been relaunched as the LIBERTY BOND. The tug lay on the bottom at Huron for several years.

* * *

The tug THOMAS MAYTHAM, Toledo, is in drydock at Sandusky, where she will be rebuilt and renamed SECOND ISSUE. Her owner and master, Capt. Charles Ellery, Detroit, is also owner of the tug LIBERTY BOND, formerly the GEORGE PANKRANTZ.

* * *

Steamer No. 214 was launched Nov. 25 at the Wyandotte plant of the Detroit Shipbuilding Co., subsidiary of the American Shipbuilding Co., Cleveland. The steamer, which is Welland canal size, is the twelfth to be launched by the company this year.

* * *

The Great Lakes Towing Co., Cleveland, will build a wrecking steamer at its Cleveland yard to replace the FAVORITE, which has been taken over by the government for salt water service. The estimated cost is $400,000.

* * *

The steel freighter AUGUST ZIESING was launched at Detroit Oct. 30. She was built for the Pittsburgh Steamship Co. The vessel is 605 feet long, 60 feet beam and 32 feet deep, and has a capacity of 12,000 tons.

News of Boston Harbor

By George S. Hudson

Capt. Jason McKown, Malden, Mass., will command the new motor schooner EDITH NUTE in the Brazilian trade. The NUTE is nearing completion at Rockland, Me.

* * *

The six-mast schooner WYOMING and the four-mast schooner ADDISON E. BULLARD, loaded for France, have discharged cargoes under the new government ruling which keeps sailing vessels out of the danger zone. The schooners are to return to the coastwise coal-carrying trade.

* * *

The Merchants & Miners steamer POWHATAN, sunk about a year ago, has been raised and will be rebuilt and placed in the coal trade by the McCormick Shipping Co., Boston.

* * *

The two-masted schooner HERMAN F. KIMBALL, damaged by fire in a cargo of lime and later sunk, has been sold by the Edward Bryant Co. to the Boston Shipbrokerage Co. The schooner

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was built at Boothbay Harbor, Me., in 1888.

* * *

Eight steam trawlers for the Bay State Fishing Co., of Boston, are under construction at Great Lakes ports and it is hoped to move several of these vessels to the Atlantic seaboard before close of navigation.

* * *

The three-masted schooner EDWARD R. SMITH has been sold by Rogers & Webb, of Boston, to the Clinchfield Navigation Co., New York for about $70,000.

* * *

Each of the steamers of the United Fruit Co. is carrying two or more graduates of the shipping board's schools in navigation and engineering, the idea being to give the young men actual sea experience before handing them commissions as officers.

* * *

The France & Canada Steamship Co. during the past year has purchased 14 schooners for the overseas trade. All the vessels were engaged in the coal trade between Chesapeake Bay, Boston and other New England ports. Most of the fleet were under the Winslow house flag and were managed in Portland, Me.

* * *

The Commonwealth Fisheries Co. has added 12 schooners to its fleet running to the Boston Fish Pier, supplying the New England and middle western market.

* * *

Capt. E. W. Hickey, for three years commander of British steamships operating in the war zone, will spend the winter at his home in Newton, Mass.

* * *

Steamship service between Boston, Eastport, Me., and St. John, N. B., has been suspended by the Eastern Steamship Lines, Inc., because so many of the company's ships have been requisitioned by the government. The service had been in operation continuously about 70 years.

Along the Atlantic and Gulf Coasts

BILOXI, MISS., which already has seven good-sized shipbuilding plants and half a dozen repair yards, soon will have another plant backed by eastern and Mississippi capital. The Biloxi Commercial club, which has been largely responsible for bringing these yards to the gulf port, has appointed G. W. Grayson and V. J. A. Tucei as a committee to obtain options on several sites, with power to close the deal for any one of them which fills the demands of the new company. A yard containing ways and sufficient space to repair three seagoing vessels at one time in addition to those building, is planned. Names of the men behind the project will not be given out by the club until the site has been secured.

* * *

ROSEMARY, a five-masted auxiliary schooner, equipped with full diesel engines, and the largest vessel of her kind ever built on the gulf coast, is at Gulfport, Miss., loading mixed cargo for continental Europe. ROSEMARY, recently launched at Back Bay, Biloxi, as previously described in THE MARINE REVIEW, is planned to be the first of a fleet of large auxiliaries for the transatlantic trade. She was outfitted in Mobile, receiving her spars and rigging from the Alabama Drydock & Shipbuilding Co., and the A. H. MacLeod Co. Originally intended as a lumber carrier, this big schooner has a capacity of 1,000,000 feet, and it is intended, after the war, to put her and her sister ships in the lumber trade with Latin-American ports. She was built by and for J. F. Stuard of Gulfport.

* * *

The Coast Ship Co., Biloxi, Miss., is at work on six 2000-ton schooners, all auxiliaries, and most of them destined for the Latin-American trade, which has fallen off greatly owing to the impressing of every former gulf steamer into transatlantic business. An effort will be made to equip these big auxiliaries, all of which will have full diesel engines, for cattle-carrying, inasmuch as, with the lifting of the embargo on Latin-American cattle by congress, hundreds of thousands of head in Honduras, Nicaragua, Guatemala and Colombia are awaiting shipment to New Orleans. The Coast company has located its yards on Back Bay, and announces, through D. J. Gay of Biloxi, president, that it has in sight contracts for 14 more similar vessels. The plant now being completed cost approximately $75,000 and is understood to be backed largely by Henry Piaggio of Orange, Texas. The company is employing 500 men.

* * *

Mobile is making a heavy bid for leadership as the principal shipbuilding port of the Gulf coast, and, with her deep water harbor, proximity to the Gulf and her excellent inland waterway system, tapping the iron and coal regions, is making New Orleans hustle. The Mobile Shipbuilding Co. announced early in December that it had completed six marine ways in its yard at the foot of Texas street on the Mobile river, and that the keel of the first of the 18 composite ships to be built for the government by this company, would be laid about Dec. 5. Two other keels will be laid during December and the first vessel of the $10,000,000 fleet will be launched March 1. R. G. Fife is at the head of the company.

* * *

Seven hundred workers in the employ of the J. J. Newman Co., at Hattiesburg, Miss., have pledged themselves to devote extraordinary efforts to the production of timbers needed for the construction of government ships along the Gulf coast. It is probable that this company's plant will be operated night and day to meet the demand for a certain class of timbers.

* * *

The Henderson Shipbuilding Co., Mobile, Ala., is about to launch the second of the four submarine chasers it is building for the federal government, the first having been put into the water at the end of October. Two others will be launched by the middle of January. Besides building these boats, the Henderson company is constructing a floating drydock of large size for ship repairs.

* * *

The Gulf States Shipping Association has been organized at New Orleans, with representatives of shipbuilding firms in Louisiana, Texas, Mississippi, Alabama and Florida in its membership. Fred W. Salmen, of Slidell and New Orleans, was elected president; L. N. Dantzler, Moss Point, Miss., vice president; H. C. Murnam, Mobile, Ala., vice president; G. H. Dunlap, Mobile, treasurer; and L. G. Blodgett, Pascagoula, Miss., secretary. The objects of the association are to further the interests of the shipbuilders of the south.

* * *

The Slidell Shipbuilding Co. has launched another 2000-ton wooden steamer, built for Norwegian owners, at Slidell, La. It is a sister ship to BALTICS Nos. 1 and 2, previously described in these columns.

* * *

Captain Valsin Jacob, one of the oldest steamer captains in New Orleans, died there at the age of 82 on Nov. 28. He was a veteran of the Confederate army in the Civil War, and was known to every port on the Gulf.

* * *

The Mississippi River Commission ended in New Orleans Nov. 30, an inspection trip down the river, which began in St. Louis Nov. 13, on the commission's steamer MISSISSIPPI. Conferences held at almost every town on the trip culminated in a meeting between the commissioners and Orleans and St. Bernard Parish levee and river boards on the steamer in the afternoon of the day of arrival. Brig.-Gen. W. H. Bixby, U. S. A., retired, president of the commission, declared that all work along the river is in good shape and had advanced further than usual at this time of the year.

* * *

The Mississippi Shipbuilding Co., at Biloxi, will launch, early in February, the first of several 2000-ton auxiliaries for which it has contracts. The plant is employing 400 men.

* * *

French interests have purchased from Mitsui & Co. the 8800-ton steel cargo steamer NIKKOSAN MARU, now completing at the yards of the Skinner-Eddy Corp. This vessel is a sister to the LIEUT. DE MISSIESSY, recently sold by the same firm. These keels were originally laid down by the builders on their own account, then sold to the Japanese firm and now transferred to the French.

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Equipment Used Afloat and Ashore

Grate Bar—Pipe Dies—Pneumatic Painting

A GRATE bar adapted to marine boiler use is offered by the Thomas Grate Bar Co., Birmingham, Ala. The use of this grate bar in a corrugated internal fire box is shown in the accompanying illustration.

The bars, which are elliptical in section, are controlled by the shaking mechanism in such a manner that they may be "wiggled" to a small degree to drop the finer ash, or may be opened to 85 degrees to dump the coarser material.

The method of firing recommended by this company provides for a fuel bed from 4 to 6 inches in depth over the entire grate area. As the bed commences to build up the fine ash is sifted out. When a thorough cleaning is necessary, one section of the grate area is allowed to burn down, and is dumped while a double quantity of fuel is fed to the active area. It is claimed that these operations may be carried on and the grates handled without opening the furnace doors except to add fuel.

Pipe Cutting Dies

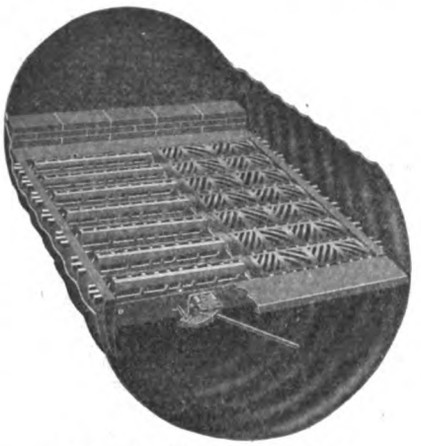
The Borden Co., Warren, O., has prepared a catalog of threading and cutting tools adapted to all the requirements of pipe fitting work. Die stocks are shown which will handle pipe ranging from ¼-inch to ¾-inch up to those ranging from 9 inches to 12 inches in diameter. The peculiar design of the die stock permits the die to be automatically moved away from the pipe while cutting, allowing a tapered thread to be made by a die which is not tapered. The adjustment to accommodate different sizes of pipe is made without changing dies. The pipe cutting tools shown in the catalog have as a fundamental feature, guides which ride ahead of the knives and limit the depth of the cut, and an automatic feed through the pressure of coiled springs. A square end cut upon which there is no burr is claimed.

Pneumatic Painting

Paint and other protective liquids may be applied to the uneven surfaces encountered in marine work by a pneumatic painting equipment offered by the Spray Engineering Co., Boston. This equipment consists of a supply tank, connecting hose, and nozzle. The container or tank is supplied in 3 or 5-gallon sizes, and is connected to the nozzle or gun by 12 feet each of flexible metal-lined material hose and heavy rubber air hose. An extension pole equipment increases the operator's range about eight feet, a point which is advantageous in the coating of hulls of ships, stacks and structural framework.

The air-tight container prevents the admission of dirt and also prevents the formation of an air film or "skin" on the surface of the liquid used. By means of adjustment devices a fishtail spray may be obtained, and interchangeable caps provide for the use of all classes of liquid coatings.

The pressure-head control is mounted directly on the paint container and includes all parts for maintaining the proper pressure on the material and air. The design of the control head permits refilling the container without shutting off the main air supply. Gages show the pressure on the material tank and gun.



MARINE TYPE GRATE BAR

Seattle is Busy

Seattle now has 42 ways for constructing large wooden ocean-going vessels. A year ago the total number was five. From present indications, the number of ways will exceed 50 before Jan. 1. The Meacham & Babcock Shipbuilding Co., a new company at Salmon bay, has recently completed six ways and laid the keels for two wooden ships. The Allen Shipbuilding Co., another new concern located at the junction of Salmon bay and the canal to Lake Union, has completed two ways and will construct four more. The new Nilson & Kelez Shipbuilding Co. has completed its three ways in the East Waterway and is ready for building operations. The Elliott Bay Shipbuilding Co., one of the strongest of this year's additions to the wooden shipbuilding industry of the Pacific coast, has completed five ways and laid the keels of two large vessels. Two ways have been added to the plant of the Puget Sound Bridge & Dredging Co. at Harbor island, making a total of seven. The Wilson Shipyards, an old wooden shipbuilding concern, has completed its new plant, including three ways. The new Patterson-MacDonald Shipbuilding Co. is constructing large wooden vessels in each of the four ways recently completed. The National Shipbuilding Co. has completed four ways and is now constructing two large ships. The new Ballard Shipbuilding Co. is laying its second ways at Salmon bay. It is now building a large wooden ship.

Contract Received

The Submarine Boat Corp recently received a second contract from the Emergency Fleet corporation to construct one hundred 7500-ton merchant vessels. This is in addition to the Boat corporation's original contract which called for fifty 5000-ton vessels. The value of the first order is $38,000,000, and of the second, approximately, $72,000,000. The Submarine Boat Corp., in executing both orders simply is acting as agent for the Emergency Fleet corporation, since the latter will finance the work. As recently reported, contracts for the fabricated steel for the first 50 vessels have been let. It is expected that arrangements shortly will be made for the fabricated steel for the second order for 100 vessels.

A special course in ship and boat woodworking is offered by the Pratt institute, Brooklyn, N. Y. The course covers a period of two terms of 12 weeks each, classes being held three evenings per week. The instruction includes shop work and talks on practical subjects connected with the work of the ship carpenter.

R. L. Browne, who for the past 15 years has been identified with the electrical and mechanical engineering profession, has recently become associated with the sales department of the Goldschmidt Thermit Co., New York, in the capacity of commercial engineer.

The Murnam Shipbuilding Co., Blakely Island, Ala., has completed two sets of ways and is laying the keels for two large vessels.

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